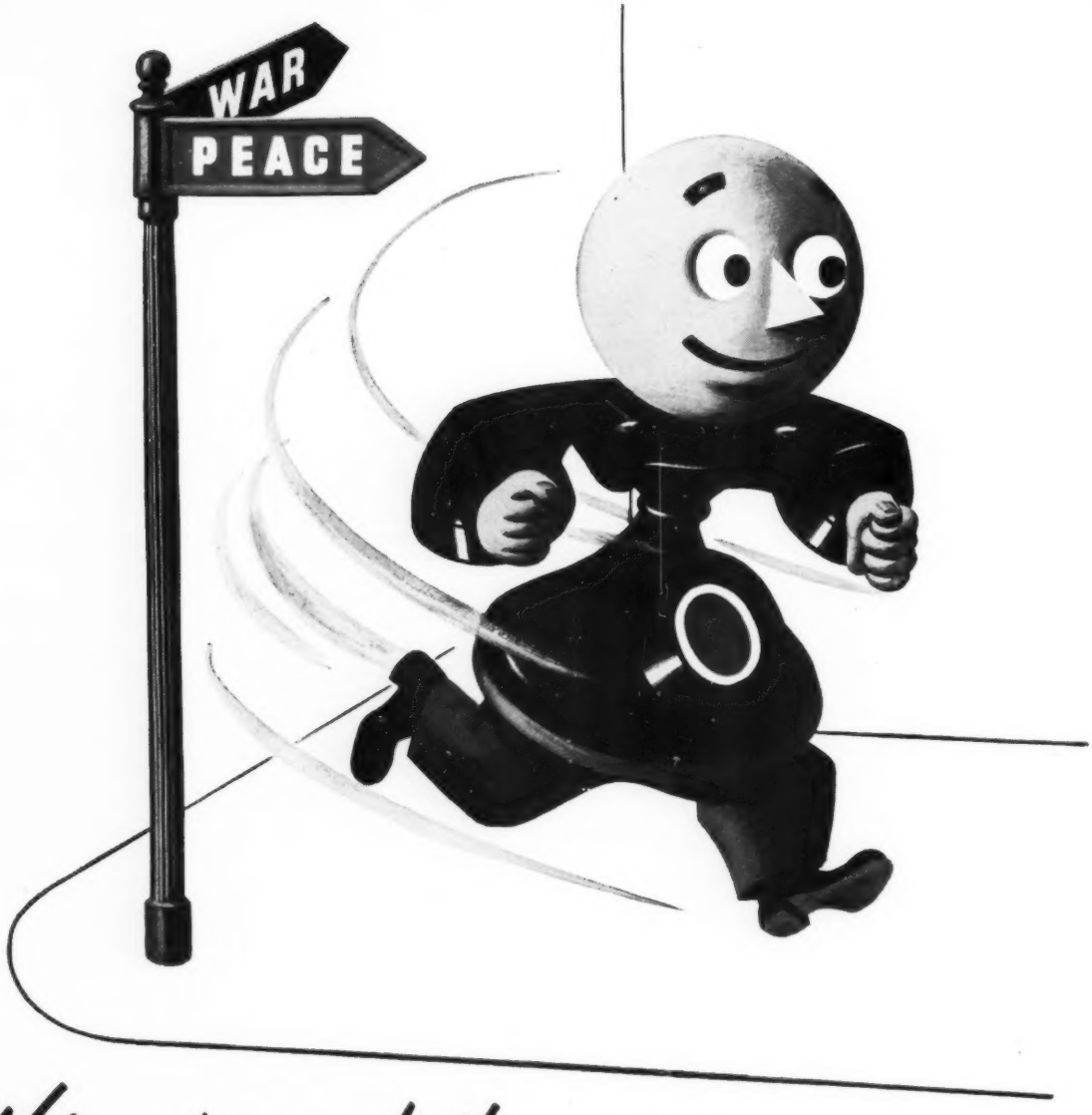
AMERICAN



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The peak of the Bell System's telephone shortage was in August. Then we had about 2,100,000 unfilled orders for service.

More orders are received every day, but now we are installing telephones faster than the new orders come in. We will get 700,000 telephones from July to December 31 this year, and 700,000 more in the first three months of 1946.

Western Electric, our manufacturing company, is setting up every machine it has that will make telephone equipment.

In the next 12 months we expect to install more telephones than there were in all of France and Belgium before the war.

Even that will not give service to every one who wants it in that time. There are places where we have complicated switchboards to install—even places where we must build new buildings for the new switchboards.

But we are on our way to give service to all who want it—on our way to restore Bell System standards of service and raise them even higher.

We are turning our facilities back to civilian service just as fast as we turned them to the instant needs of war.

BELL TELEPHONE SYSTEM

AMERICAN FORESTS

VOLUME 51 OCTOBER, 1945 NUMBER 10

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THE COVER
"Moose In the Selway Wilderness of Idaho"
Photograph by K. D. Swan, U. S. Forest Service

American Forests

Published monthly by

THE
AMERICAN FORESTRY
ASSOCIATION

919 Seventeenth Street
Washington 6, D. C.

The American Forestry Association, founded in 1875, is a citizens' organization for the advancement of intelligent management and use of the country's forests and related resources of soil, water, wildlife and outdoor recreation.

Its educational activities seek to bring about a better appreciation and handling of these resources, whether publicly or privately owned, that they may contribute permanently to the welfare of the nation and its people.

In addition to publication of its magazine—AMERICAN FORESTS—designed to keep before the people of the country important conservation questions and issues, the Association carries on educational work in various fields including forest fire prevention, reforestation, protection of wildlife, prevention of soil erosion, preservation of wilderness areas, establishment of national forests and parks, advancement of forestry by private endeavor, the teaching of conservation in schools and the promotion of research in timber growing and forest utilization.

The Association is independent and non-commercial, and has no connection with any federal or state governments. Its resources and income are devoted to the advancement of conservation in the interests of public welfare, and all citizens are welcomed to membership.

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THE FOREST EXCHANGE . . .

It's All Over Now!

SIR: Regarding your editorial, "Lumber Pattern for the Pacific," in the August issue:

Why not convert some "Baby Flattops" into sawmills? First, build a chute in the stern like the modern whalers, through which logs could be got on deck. Circular mills to square the logs, thence by rolls to band mills, slabs to hogs for fuel. Finished timber and lumber to go forward on live rolls, to points where landing craft moored alongside would get the sorted sizes dropped from the rolls.

Such floating mills anchored in snug harbors near the forests would save road building and be more healthful for the men. Small power boats would pick up and tow the logs to the mill.

If you like my idea, please push it to the proper authority and help save our timber.—*Lawrence J. Mead*, Darien, Connecticut.

Forestry "Down Under"

SIR: Under separate cover I am forwarding copy of a booklet on Wagga Wagga (New South Wales, Australia) which should show you how much has been done to beautify the town with trees, notable amongst which are poplars, planes and kurrajongs (brachychiton). At present we are experiencing a terrific drought, but whereas this has affected stock, the regeneration enemy to us is erosion, which while not on the scale of your Colorado Canyon, is an immense factor to these parts.

This our government is trying to overcome by forestry. Through the past 20 years and more, the idea of planting more trees to safeguard against drought conditions and erosion, as shade for stock, and even as feed in dry conditions, has been pounded into the cocky's (our farmers), but to no avail. "Easy come, easy go" is their unofficial slogan, though they themselves may be unconscious of it. Still they continually light careless fires, and bring action on themselves with fines, etc. But it fails to teach them a lesson. Therefore, the only policy to turn to must be in the schools. If men and women grow up with this ideal in mind, they will always stick to it.

Many country people are awakening to the fact that trees are an excellent windbreak and stop wind erosion. Our country is really awakening to forestry. More and more money is being given to it.

I am only a beginner in forestry, will be nineteen next month, and am enthusiastic in practical experiences.—*John A. Burnett*, Wagga Wagga, New South Wales, Australia.

A GI's Appraisal of German Forests

SIR: I was very pleased with the article in the July issue by Erle Kauffman, en-

(*Turn to page* 518)

A Tocco induction heat-treating machine for hardening track shoe pins in the Oliver "Cletrac" plant.

It's our "treat"

On a crawler tractor, the track shoe pins are subjected to destructive abrasion shocks and strains. To resist these . . . to assure longer pin life, Oliver "Cletrac" tractors have hardened pins . . . electrically heat-treated to an exact depth by the most modern methods.

This *extra* quality is characteristic of every Oliver "Cletrac" tractor part . . . a basic feature of every manufacturing operation.

Quality is fundamental to every production step in the modern Oliver "Cletrac" plant . . . in materials, workmanship, and equipment.

Maintenance of that standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors . . . for your every need.

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My Favorite Tree

By W. S. ROSECRANS

President, The American Forestry Association*

MY favorite tree does not have abundant foliage as a great maple or a splendid elm, nor a magnificent spread like some old oak or chestnut, nor great height like a giant redwood. Yet it is a valiant tree, sometimes misshapen, sometimes bent or broken, struggling to survive under adverse environment.

Sometimes it is found along a rocky coast where its gnarled shape and straggling foliage, torn and twisted by the forces of nature, bear mute witness to conflict against harsh winds and ocean spray.

It may be located on some sand dune being gradually engulfed and buried by the shifting winds. Or it may be on a barren desert with barely enough moisture to live on—or upon some towering mountain near timberline making a sturdy fight against snow, ice and storm.

Again, in contrast, it may be in some great metropolis trying under unnatural conditions to grow luxuriantly and provide green shade in soil sealed down with cement and with noxious gases polluting the air it breathes. Always it is a *valiant* tree, filled with the urge to live and willing to take on an unequal struggle. Always I hope it survives, for it is very dear to my heart.

---

*Mr. Rosecrans is also Chairman of the California State Board of Forestry and the operator of a date garden, where the above picture was made.—EDITOR.

Prairie Chicken . . .

One of the striking plates in the book "The Prairie Chicken in Missouri," by Charles W. Schwartz

EDITORIAL

Challenge of the Tillamook Burn

NORTHWESTERN Oregon's forest fires, in what is generally referred to as the Tillamook area (see AMERICAN FORESTS for September), have finally been extinguished by autumn rains. Without attempting to fix blame or even to propose measures for preventing recurrence of such a conflagration, one cannot escape the fact that other public aspects of the problem invite discussion.

The area first devastated in 1933 by the Wolf Creek-Tillamook fire comprises part of three counties: Washington and Yamhill on the east and Tillamook on the west. Farther to eastward is Multnomah County, with its Portland metropolitan area, and more significant, the narrow, high-walled funnel of the Columbia River gorge.

Since early settlement days the gentle slopes of southeastern Washington and northeastern Yamhill counties have supported a rich agriculture. It is 35 miles from Portland across this farming district to the eastern edge of the great burn. Beyond lies the jumble of the Coast Range, rising to 3 thousand feet and cut on both sides by deep, crooked ravines. Prior to September 1933, this farther area of a quarter million acres was covered with a noble forest of Douglasfir, red cedar and hemlock.

Western Tillamook County, from the Coast Range summits to the ocean, enjoys yearly rainfall of 100 inches or more, but practically all of it comes during autumn, winter and spring. Similarly the interior counties receive 40 to 60 inches annually, yet many farmers irrigate in July and August. Most of the time throughout the year, moisture-bearing westerly winds blow off the Pacific and across this region, but in summer they release little or no water. Occasionally something even worse happens; hot winds from eastern Oregon rush westward through the Columbia gorge funnel and blow their searing breath over orchards, fields and forests lying between Portland and the sea.

One can visualize the whipsaw action of these winds upon forest fires in such rough country. In September 1933, beginning with small blazes which were spread widely through dry logging slash by brisk westerlies, there was built up a general conflagration requiring only a culminating blast of dry east wind to drive it irresistibly to the coast.

Lumbermen and foresters estimated that 11 billion feet of merchantable timber had stood in the fire's path, and they doubted that 20 percent could be salvaged. Times were hard, ownerships mixed, and roads few through this wilderness. Also it was probable that wood-boring beetles would make salvage impracticable within five years.

Despite such complications the effort was made. Faced with total loss of tax revenue, the counties adopted liberal measures to encourage owners to salvage what fire killed timber they could. Railroads were built into the area from the east, "gyppo" operators pushed up the narrow ravines of the western side. Within three years salvage operations were well under way. Coincident with these efforts to begin logging, state and private agencies collaborated on plans for intensified fire protection.

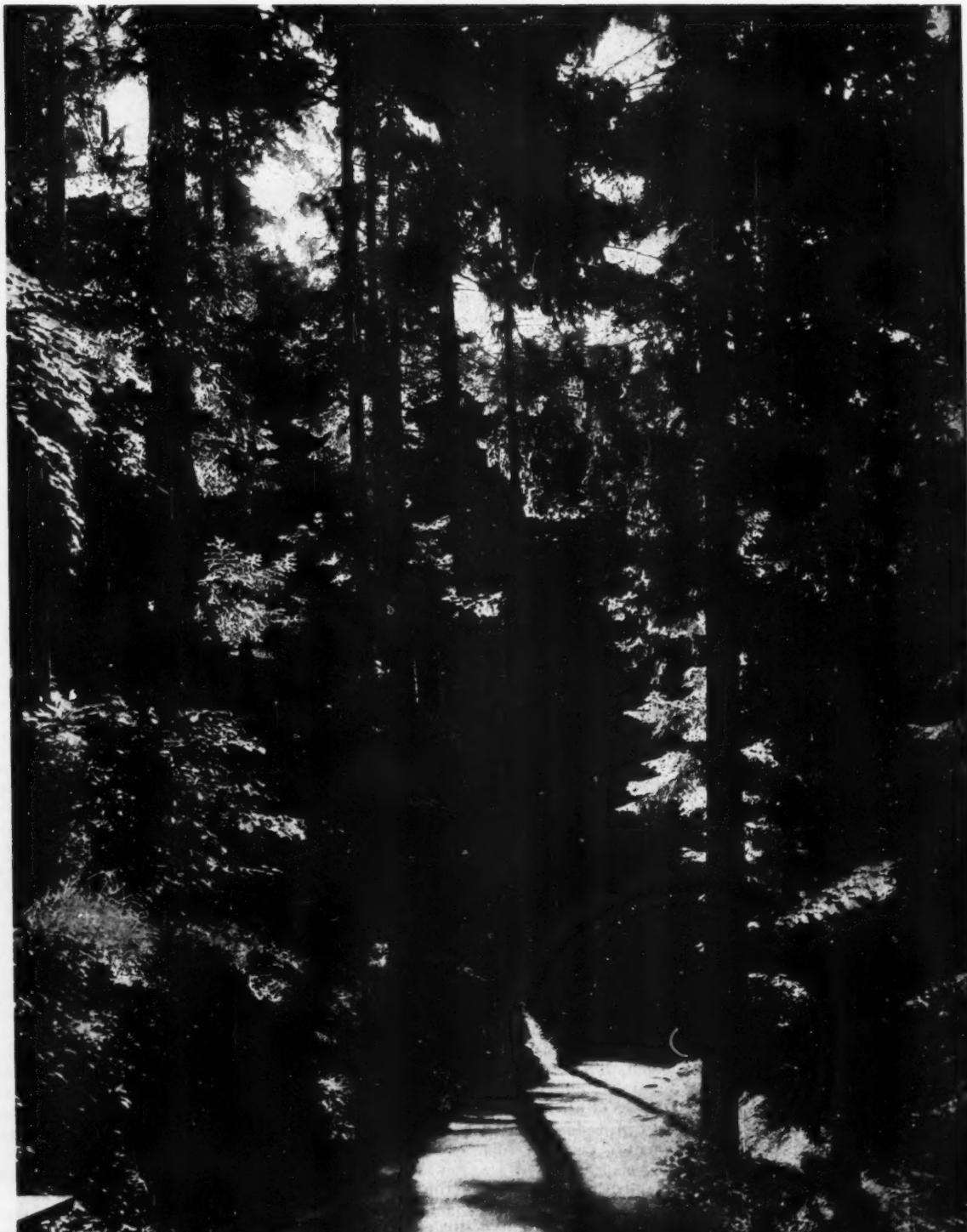
For a time all went well, but in 1939 a series of fires in logging slash built up dangerously and finally joined to run over much of the area burned in 1933. Once again timber owners and public agencies paid out vast sums for fire fighting and once again they tried to improve the protection set-up. Meanwhile, because of events abroad, there was continued demand for forest products, while the wood borers failed to live up to their reputation for voraciousness. So logging went on, and by the end of June 1945, there had been taken out about 5 billion feet of usable logs. Of course, a billion feet was cut from islands of green trees missed by the first fire, but the fact remained that logging operations had salvaged nearly half the commercial volume presumably lost in 1933.

Most of this salvaged material came from the hearts of veteran Douglasfirs, and in cutting these trees and moving out the usable parts the loggers left masses of dry sapwood, limbs and the like. Thousands of smaller trees were not even worth cutting. Inevitably such logging left a serious fire hazard, and in 1945 the worst happened again. Small fires in slashings ran eastward before the west winds and westward before the east winds. Public opinion demanded that the fire be fought although such action was useless because of the rough terrain and the volume of fuel at hand. And so half the area was burned over for the third time.

Looked at from one angle these fires may be said to be a part of the cost of salvaging 5 billion feet of high grade timber that otherwise would have been a total loss. Its availability in time of national emergency has been a boon to the nation as well as to the forest owners. Timbermen say that upwards of 2 billion feet of sound logs can still be salvaged, and certainly that is worth doing. Yet Oregonians insist that this must not remain a barren waste, scourged by repeated burning.

Here then is a challenge to private, state and federal agencies to join forces in rehabilitating a problem area of vast potential productivity. Foresters agree that much of the land must be planted, that a first need is for a grid of wide safety corridors or firebreaks. And they point out that the Wolf Creek and Wilson River highways, constructed since 1933, might serve as initial lines of defense.

Snags must be cleared away from such firebreaks, millions of young trees planted to cover them with fire resistant sapling stands. So long as salvage is productive, many debris-choked ravines and snag-dotted hillsides will remain fire hazards. Yet progressively even these areas can be brought within firelines, burned out and replanted. All this will take time—possibly a decade—and money, probably several millions of dollars. Questions of who will furnish this money and who will own the new forests must be threshed out. There has been discussion before, without anything coming of it. Certainly the time is now ripe for setting up a postwar project to put this vast area back into productivity. It is important not only for Oregon but for all the nation.



The goal of forestry is continuity of use, for only in terms of human use is forestry meaningful

FORESTS IN WORLD ECONOMY

Report of Allied Interim Commission on Food and Agriculture Stresses Importance of Forests to Development of World Peace and Prosperity

In December, 1943 the United Nations Interim Commission on Food and Agriculture included forestry and primary forest products in the scope of the Food and Agriculture Organization (FAO) of the United Nations. In March, 1944 a Technical Committee on Forestry and Primary Forest Products was set up, with Henry S. Graves, Dean Emeritus of the Yale School of Forestry, and former Chief of the U. S. Forest Service, as chairman.

This Committee has just issued a report on the world forest situation along with proposals regarding the functions of FAO. So pertinent is this subject to the world-wide goal of lasting peace through the betterment of human welfare, that the first part of the report, dealing with the world's forests and the raw materials they yield, is presented here in full.—EDITOR.

AMONG the world's raw materials, wood ranks second only to food.

Next to agricultural crops, forest crops have contributed most to human progress and security and, like agricultural crops, forests possess the unique advantage of being renewable. Within wide limits man can adapt them to his needs, and by wise husbandry increase the yield and usefulness of their harvests.

Forests have played a critical role throughout man's development from primitive nomad to creator of his present complex society. His way of life has been continually shaped by the presence or absence of forest products. He is never wholly independent of them. The northmost range of the Eskimo is limited by the flow of driftwood, and throughout the tropics trees are man's shelter, fuel, and even a source of food. High living standards require the abundant use of wood, and it is difficult to envisage the spread of knowledge throughout the world without wood in the form of paper.

Forests are the economic backbone of some of the world's most advanced and prosperous nations. In Finland and Norway forest industries lead all other manufacturing industries; in Sweden they supply one seventh of the national income and create employment for one fourth of the working population.

Over 90 percent of the world's annual wood harvest is retained for domestic consumption, yet the remaining 10 percent has reached third place (cotton and wool hold first and second places) in value among all commodities entering international trade, and forest products are among the largest freight customers of the world's railroads and shipping lines.

Wood is the world's most versatile raw material but because of its very workability it continues, for the most part, to be processed with the crude methods of the caveman, disregarding the vast range of its chemical and technological possibilities, and wasting three-fourths of the tree's substance.

These archaic patterns of wood use are rapidly passing. Thousands of years of man's way of thinking about wood are being swept aside by the onrush of modern research. In the laboratory, under electronic microscopes and in test tubes, wood that yesterday was looked upon only as lumber or fuel is being taken apart and its character profoundly altered. By processes no longer in the experimental stage, wood is being transformed into dense, beautifully grained substances with the gloss of polished marble, so strong that from them are made propellers for powerful airplane engines. Layers of wood-pulp paper are being converted into translucent sheets of plastic, weighing half as much as aluminum yet with almost the tensile strength of steel. Wood is being transmuted so that it can be bent and twisted as can a rubber hose; its characteristics have been so changed that maple can be made harder than the century-slow-growing ebony; oak can be processed into synthetic boards lighter than balsa.

The chemical possibilities of wood have been barely touched. Fertilizer, molded plastics, even explosives are being derived from wood substance. Wood converted into rayon will help to bring attractive clothing within the reach of millions. Sugar, alcohol, synthetic rubber components, and food of high protein value can now be obtained from the sawdust pile. Even for fuel, industry in some countries is turning back to wood, for new combustion methods based on the gas generator promise to make it an efficient source of caloric energy.

In the face of these rapidly multiplying uses for wood which create ever-mounting wood needs, the world is confronted by the inescapable fact that the forests—sole source of wood—are steadily diminishing. Fire, ax, insects, and disease take annually a tremendous toll. Man has burned and wasted far more than he has ever used, and over most of the earth's surface he still treats the forests not as a renewable crop, but as a mine to be exploited and then abandoned. Of the famous forests of Lebanon, which once extended over two thousand square miles, only four small groves remain, and the Emperor Hadrian's forest boundary stones stand today amid barren mountains.

A host of unfavorable economic and social effects has followed indiscriminate forest destruction. In northwest China, parts of Arabia, India, and North Africa it has been a primary factor in bringing misery and starvation upon many of the oldest and most thickly settled centers; now it threatens to deprive highly civilized countries of timber needed for industry. It is not theory but fact that the stripping of mountain forests and the misuse of land result in torrents, erosion, floods, and a general change in the regime of streams; the disappearance of forests may seriously affect climate and rainfall.

Of the once heavily forested Continent of Europe, only three countries now have appreciable quantities of timber beyond their national needs. Before the war, deficiencies in world wood production were made up by northeastern Europe and North America, but these regions had already begun to feel the strain upon their forest resources. The volume of standing sawtimber in the United States has been reduced 40 percent in 30 years, and the timber annually destroyed by fire throughout North America would build a 5-room house every hundred feet on both sides of a road from Paris to Moscow. With the destruction of forests by war and the enormous need for wood immediately

after the war, a problem of supply arises whose magnitude and gravity demand an answer.

This answer we do not possess. It is a truism to say that an abundant and continuous supply of wood is essential to the world goal of freedom from want, but faced with the task of relieving lumber shortages already acute and now made critical by the devastation of war, we must admit at the outset that we lack the fundamental data to formulate our problem in meaningful terms and point to specific remedies. We can make only very broad statements and draw very broad inferences regarding questions of world wood supply, for there is no unified body of statistics regarding world forests or forest products. World figures are prerequisites for balancing the world's forestry budget and even more for planning its expansion. Although basic to the industrial development of nations, forest resources, compared with agricultural and mineral resources, are practically unknown.

To collect and unify information is an international task indispensable to the eventual coordination of world supply and world demand. Nothing less than a permanent international agency is required to accomplish this effectively. There are many other forest problems calling for international solution. The techniques of growing forests, harvesting them, and using their products bear no relation to national boundaries; transporting and marketing forest products involve problems of international economics; research into the potential values of the thousands of species of unknown quality can best be stimulated by a world organization.

Coordinated endeavor on an international basis could not come at a more favorable time, for today the world stands on the threshold of developments in the use of wood that may be as revolutionary as the invention of the steam engine or the introduction of technology to the farm. Technology and chemistry are focusing attention as never before on the imperative need for adequate, dependable, and continuous wood supplies. Just as man has been forced to emerge from a stage of dependence on wild game and wild fruit for his daily food, so now he is being forced to emerge from a stage of dependence on wild forests for his shelter and fuel.

Vigorous, unified action by the nations of the world can shape and hasten this transition period; it can supplant the outworn concept of timber as a mine with the concept of timber as a crop, and give world forestry its place beside world agriculture as a planned and permanent form of land use.

Forests in an Agricultural Economy

Forestry and agriculture comprise man's two chief methods for converting soil fertility into raw material. The techniques applied and the time factors involved differ widely, but both have to do with growing crops, and both play complementary roles in land use as purposeful ways of dealing with the soil. Less than three acres of land is enough to raise sufficient food for each person in the United States, but for his annual wood use the yield from four acres of forest is cut.

Agriculture and forestry are not competitive, and for agriculture to prosper permanently there must be a reasonable stabilization in the balance between land for crops, land for grazing, and land for forest.

Where no such balance exists, where, as in parts of Asia and China, massed concentration of agricultural populations has resulted in the depletion or destruction of accessible forests, wood for fuel and miscellaneous farm and home use is no longer available and the exposure of the soil has brought about erosion on a spectacular scale, with rapid runoff of surface waters and disastrous floods. In the more mountainous sections of those older regions—in China and the Near East—ancient civilizations have profoundly modified the vegetative cover, and unrestricted grazing on land suitable only for forest growth has resulted in widespread damage to the soil itself. Nomadic graziers, driven from the valley grasslands by the influx of farming, have been forced to seek the sparse pasturage of mountain ranges where the forests had already been depleted by centuries of exploitation. This invasion completes the destruction already begun. Tree reproduction becomes impossible, the light sod is cut to pieces by the hoofs of animals, and the soil, deprived of all protective cover, falls easy victim to the erosive forces of wind and rain. Within a few decades regions once well forested are transformed into barren, dust-swept wastes. Thousands of square miles of rich farmland have been ruined by deposits of sand, silt, and boulders, or cut to pieces by gullies, following the destruction of forests. In such regions restoration of the forests at strategic points has been found to be the only way of strengthening the foundation for continued agriculture and support of rural communities.

But trees are not only effective protectors of agricultural soil and guardians of agriculture's water supply. They are valuable as windbreaks, to protect crops from drying out in hot winds, and to provide shelter for live-stock. Thousands of acres have been planted to trees for these purely agricultural purposes; Russia has made great progress in planting groves and windbreaks on the treeless steppes, and in North America shelterbelt and windbreak planting has developed on a large scale.

A measure of stabilization in the amount and location of land use for crop production, pasture, woodlands and industry has already been reached in Europe, and as a result close correlation now exists between well-managed local forests and the farmer's prosperity. Where woodlands are managed on a basis of sustained production there is ready at hand a supply of fuel and other products needed by the local populations. Farmers participate in the work connected with the care, improvement, and development of the forest, and in harvesting its various products Much of this work is done in seasons when there is little agricultural activity, and under such circumstances the forests can make an important contribution to the stability and standards of living in rural sections.

Wood is not only a spare-time crop, but a poor-land crop, growing on land too rugged or too infertile for raising food. Some trees, of course, are practically agricultural crops—maple sugar, nuts, products of the palms, and hosts of tropical fruits such as sapodilla and the Brazil nut, are all borne by trees; rubber is obtained from trees by application of horticultural methods; oak galls are an important source of tannin. In sections of the United States and France "gum-farming" is an important activity, and firewood is one of the world's most important agricultural crops. For more than two-thirds of the human race wood is the fuel used for cooking food, and to that extent wood becomes an integral part of the world's food supply.

Although the American farmer is important as an owner of forest land, he knows little about the care of his farm woodlands or about the value of their products; too often farm woodlands are the least productive of all forest properties. Many farmers accept lump-sum payments for their forest products, frequently at heavy economic loss. The tale is told of a farmer in the United States who sold a black walnut tree for $50 and was well content with the bargain. The buyer felled the tree at a cost of $15, and without moving it sold the logs for $138. A week later the logs were resold on the same spot for $164. It is not likely the same farmer would have sold his wheat for 50 cents a bushel if the current price had been $1.50. Nor is it likely this could happen in Europe, where the coordination between forestry and farming is more fully developed.

In England, planned coordination between forestry and farming is now being

applied to small holdings by the Forestry Commission. The better-quality land acquired for state forests is reserved for agricultural use and divided into tracts averaging about ten acres. These are leased to settlers, and each small holder is guaranteed 150 days of forestry work a year. The rest of the time he works on his farm, raising food for his own use and for sale. In this way a dependable supply of resident workers is obtained for reforestation, development, and eventual utilization of the state forest, while at the same time hundreds of workers and their families are settling on farms and gradually repopulating the countryside in the neighborhood of the forest. In this case, forest work alone, or agricultural work alone, would not suffice to support these families. Again, in the semidesert areas of southwest India recently brought into irrigated cultivation, an adequate portion of land has been allotted to forest plantations to meet the needs of the farmer colonists for fuel and timber.

The abandonment of farms in parts of the United States illustrates yet another phase of the interdependence of agriculture and forestry; farm abandonment is usually the result of a complex of factors and seldom, if ever, do these forces operate singly, but forest destruction often plays an important part. In many regions where agricultural settlement was directly associated with the utilization of a forest, exhaustion of the timber and withdrawal of the timber industry have been swiftly followed by loss of local markets for farm products. Upon cessation of the timber traffic, the removal of railroads and the increased burden of taxation have made it impossible for many farmers to carry on; the result has been virtual depopulation, even in localities where soil quality would justify permanent agricultural utilization of the better lands.

But just as forests are important factors in a permanent agriculture, so will agriculture always be a factor in timber economy, since forest problems cannot be resolved without taking account of the enormous quantity of timber growing on farms. In the United States the farmer is the greatest wood user and one of the greatest wood owners. Farm woodlands aggregate almost 140 million acres, or about 30 percent of the nation's commercial forest area—in the eastern United States alone the area of farm woodland is five times that of the forest land of France.

Seventy percent of the forests of Norway are owned by farmers, and in Sweden farm woodlands and small properties make up 45 percent of the forest ownership. In the rugged hill country of central Germany forests were regarded as the backbone of the peasant economy, and the farm woodlot embraced one-fourth of the forest area. The intensity of farm woodland management had a decided influence on the total yield of the German forests.

Sixty percent of the softwood timber upon which the world depends for construction material is in North America and Europe—areas containing only one-third of the world's population. Above is a well-managed German forest

So, from the standpoint of conserving irrigation water and protecting the soil, forests play an essential role in agriculture; from the standpoint of timber production from farm woodlands, agriculture plays an essential role in forest economy. Work in the woods enables many a farm community to exist, and the existence of farm communities creates markets for the wood industries and provides manpower for logging. Agriculture and forestry make common cause, and only when they are seen as interlocking, mutually sustaining meas-

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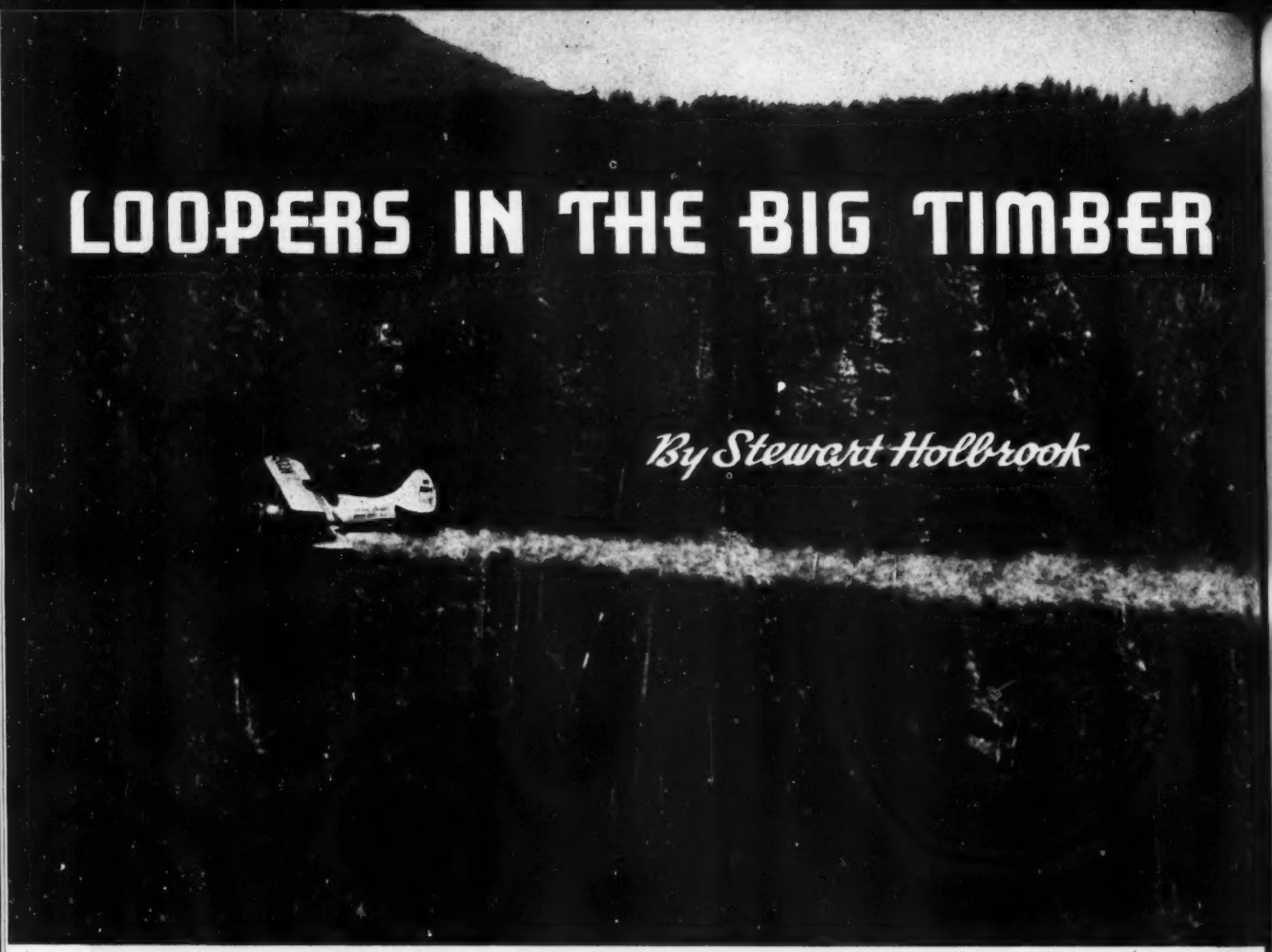


LOOPERS IN THE BIG TIMBER

By Stewart Holbrook

What Happened This Summer in the Oregon Woods When DDT Was Turned Against the Hemlock Looper, Hungry Enemy of Big Timber

WHILE several thousand men were working night and day last July in an effort to stem the great forest fires in Oregon, and the newspapers of the country were reporting the battle, a crew of 20 scientists and loggers were staging an unheralded battle against a less spectacular but equally deadly enemy of the timber. The hemlock loopers were out in force and if they were not stopped before winter, there was no telling the fate of one of the nation's greatest stands of big timber. And by big is meant stuff that measures up to 15 feet in diameter and requires a steel tape 50 feet long to gird it. It takes a gang of loopers a mere two months to strip and kill such behemoths of the forest.

The professors have a powerful name for this most devastating and perhaps least known enemy of the timber. They term it *Ellopia lugubrosa,* which still is hardly adequate to describe so swift and voracious a menace as the small green worms which woodsmen call hemlock loopers. But this year, and for the first time in woods history, the hosts of loopers were met with a lethal 2-plane air force that fired DDT, the new insecticide; and though late in August the issue was far from certain, the loopers in July were dying not by the million but by the billion. To be more exact, they were dying at the rate of better than 4 million loopers an acre of timber.

The first intimations of the present troubles in the Oregon woods occurred one bright October day two years ago. Bill McCulloch, an assistant state forester, was making a routine cruise along the historic Lewis and Clark River. He loped easily through the tall trees, his eyes sweeping the virgin hemlock and spruce, with here and there a gigantic Douglasfir, which hemmed the logging road on both sides. At a spot described in the language of woodsmen as Section 30, Township 5 North, Range 5 West, Forester McCulloch was stopped dead in his tracks. A huge cloud of small, buff-colored butterflies suddenly winged out of nowhere and soared up and up, even above the 15-story-tall trees. Then they disappeared.

It was not the beauty of the moths that stopped McCulloch. It was the possible danger they presaged. McCulloch is a brooding soul, and he wondered if the flight might be the hemlock looper in its final, or moth stage. He looked around closely for signs of looper damage, found none, but reported the butterfly cloud to the Bureau of Entomology in Portland. The bureau promptly made an investigation and could find no looper signs which, it seems, do not appear

When the loopers strike. Only forests near the top of ridges (dark area) survived this 1918 infestation

A closeup, magnified, of the hemlock looper, which devours its weight in needles in an hour—every hour

immediately even in the worst infestations.

Almost a year passed. Then in September, 1944, Alex Brandstrom, forester for the Crown Zellerbach Corporation, large owners and loggers of timber in the region, got a 'phone call from one of his camp foremen, several miles from where McCulloch had encountered the cloud of moths. "Lots of hemlocks around here beginning to turn brown," said the woods boss.

This was enough for Brandstrom. He got to the Lewis and Clark area like a fireman responding to an alarm, put on his calked shoes and went to cruising. Sure enough, the fine, straight, tall hemlocks 300 years old, were dying by the thousands. Not only the hemlocks, but the Sitka spruce were dying. So were the great cedars, 700 years old. So were the scattering giants, the Douglasfirs. So were the leafy alders along the streams. Even the brush was dying. Leaves and needles had been eaten clean; nothing of foliage was left to plant or tree.

Brandstrom had seen looper work before—and this looked like loopers. He called the U. S. Bureau of Entomology. Robert Furniss, a bureau scientist, went to the dying woods, gathered some minute stuff from the surface of tree moss and lichens, and put it under a microscope. "It's the looper," he said, "and plenty."

Furniss then climbed into a plane and for the next few weeks used all good flying weather to skim close over the tops of many square miles of timber in the region, mapping the infestation as well as he could. His report was grim enough: at least 22 thousand acres were infested, and more than half of this area was literally being eaten alive by the loopers. Given another year of unhampered foraging and breeding, the looper, judging from known performances, would bring the

dead area to 110 thousand acres, and in two years to 550 thousand acres. That is fast destruction when it is considered that the hemlock looper, in its dangerous form, is never more than an inch and a half long, and has to crawl, measuring-worm style.

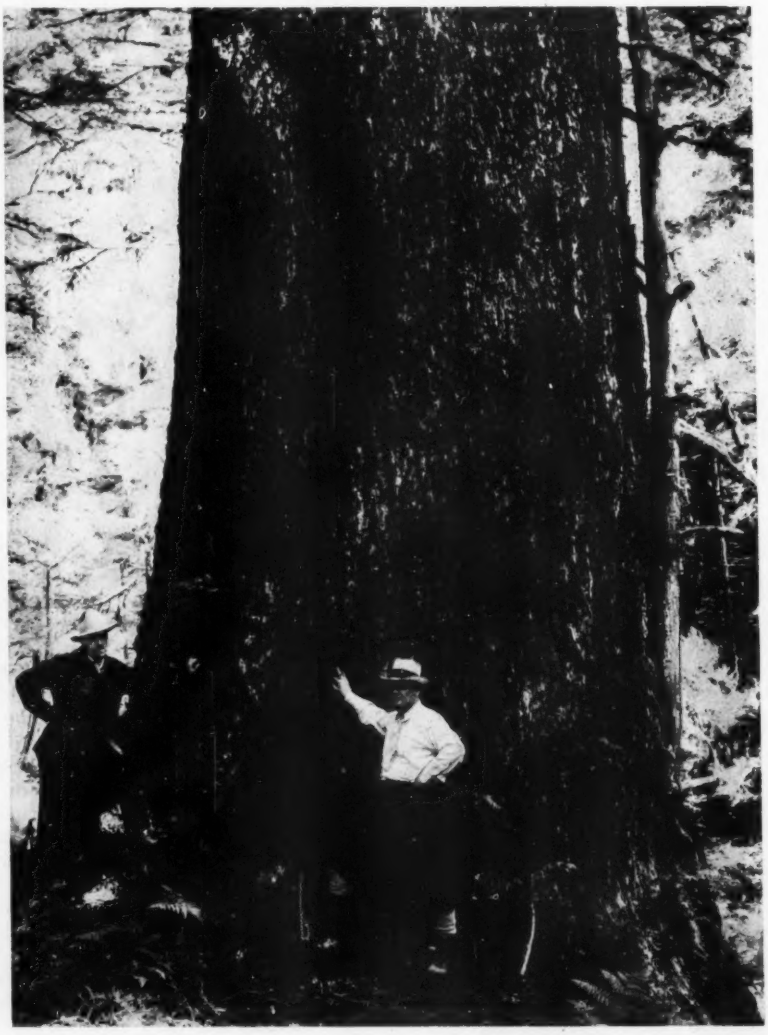
The looper appears in four forms during its life cycle. Adults are moths. They lay eggs which hatch from early May to mid-June. From the eggs larvae emerge. These do the damage. They begin to eat at once and never let up, night or day, until mid-September when they are transformed into pupæ, the intermediate stage between larva and moth. From pupæ, they return to the moth or butterfly stage, and lay their eggs.

Incidentally, the looper larvæ are not susceptible to a mere brush-off by either wind or man; they carry a roll of silken thread, like spider webbing. When knocked off a twig, they climb quickly back to their perch via their life lines to resume their one occupation — eating. Their digestive apparatus must be one of the marvels of the animal kingdom, for a looper eats his weight in hemlock needles in an hour, *every* hour, until he passes, most contentedly one can imagine, into his dormant pupæ stage. Nor is he any gourmet; he will eat just as much fir and spruce as hemlock. He merely prefers hemlock, and on the stuff that laid Socrates low, the looper fattens, grows greener, meaner, and hungrier by the hour.

Getting at the loopers of the present infestation is no job for men on the ground. The affected area ranges from a little above sea level up to nearly two thousand feet elevation in the mountains of the Coast Range. No rougher terrain exists in the United States, and the ground cover beneath the tall trees is jungle, through which a good woodsman is able to move at the rate of a mile an hour—for the first hour.

While Scientist Furniss was making observations by air, Forester Brandstrom and Assistant State Forester John Woods, together with a party of sharp-eyed men, cruised the infested area from the ground. They estimated that 40 million feet of fine timber had been killed outright; that 500 million feet more had been affected in lesser degree and was in immediate jeopardy. This is an awful lot of timber.

Once the ground and aerial surveys were done, no time was lost. Crown Zellerbach put crews to building truck roads into the worst infested areas, and started men felling the dead timber in order to salvage it. Because the timber in the region is owned by many concerns and individuals, it was thought best to pool all interests and ask Oregon's state forester, Nelson Rogers, to assume charge. The Bureau of Entomology supplied the technical knowledge by detailing Furniss to the job of extermination, and with him a crew of experienced bug-killers. Crown Zellerbach and smaller interested concerns supplied the cash, and Crown added considerable manpower to the project.



The author, left, and Forester Alex Brandstrom examine "The Tree," giant Douglasfir infested by loopers. DDT probably saved its life

Scientist Furniss, a quiet, youthful appearing man, knew that hemlock looper infestations in the past had been few and spaced many years apart. Oddly enough, the last great looper infestation in Oregon began in 1918, just as World War I went into its final phase, and continued into 1921, killing 500 million feet of fine old timber. Furniss knew that arsenate of lead would kill loopers. But arsenates are bulky to handle and their effects slow. What Furniss wanted to try was DDT, which was and had been on the strictest priority. An application, stating bluntly the real danger that Oregon's forest were facing, brought a small amount of the new poison; and to round out the ammunition, 60 tons of arsenate of lead were secured.

There was little use in applying the poison until the spring-laid eggs of the looper hatched in May and June of 1945 and the larvæ began to eat. So the crew, which never numbered more than 20 men, moved into an old logging camp on the Lewis and Clark and set up their main laboratory in a bunkhouse. They gathered looper eggs from moss and lichens and put them into incubators. They set up looper compounds in the woods, crude field laboratories that would light the eye of the great Asa Gray and the fabulous Louis Agassiz. And when the eggs began to hatch, they brought limbs covered with tiny loopers to the compounds, there to study them. Over the growing limb of an infested

tree, here and there over 12 thousand acres, they placed a cloth cage with glass front, in order to note and check the rate of looper appetites.

To do the spraying, Central Aircraft, a commercial concern that specializes in spraying but had never tackled loopers, was engaged; and the looper-killer crew turned to and fashioned an airport for the looper fleet. They discovered a few fairly level acres of rather damp land near the foothills, cut off the brush and threw down some plank to give the planes a 100-foot running start before they came to the none-too-firm ground. They set up rigging for mixing the poisons. And one great day this past June, trucks drove up to deliver the arsenate of lead and the DDT, which looks like a high grade of white flour. Two days later, there came a snorting overhead, and two tiny Waco biplanes, piloted by R. B. Allison and Al Ausve, came down out of the mist to make jolty landings on "Looper Airport."

In the meantime, Walter Buckhorn, no scientist, yet one of the great glories of the Bureau of Entomology, had been doing hazardous work up in the timbered hills. This stocky and apparently indestructible man armed himself with spurs, belt and ax, and climbed up 250-foot trees at section corners of the infested areas and nailed a white flag to the top of each—the very top.

This was a task for a stout and brave man—and Buckhorn is one. In days past he was a barnstorming pilot, making the state and county fairs of the Midwest in crates of planes; and on days when his hotcakes and coffee had set well, it was his practice to crawl out on a plane's wing, two thousand feet in the air, and "ride her handsome," to the great awe of the gaping crowd below. So "Buck" found that hanging to the wildly swaying top of a 15-story tree was rather nice, if dull, work. When he was done climbing, the looper-infested forest was marked to show the fliers the lines of their targets.

It seemed necessary to know, once it was started, how much damage to the loopers the spraying was doing. Test screens were set up in selected spots throughout the vast area. These screens were merely a spread of white muslin to catch the corpses as they fell. When they were in place and the marker-flags were flying, the zero hour for the big drive was set.

One fair morning in the last week of June, the crew mixed up a good dose of DDT—at the rate of one pound to two gallons of fuel oil—and put it into the tank of one of the little planes. The plane coughed a few times, shuddered, and ran down the planks to rise quickly. A moment later it was chugging close over the top of the interminable forest, a long white tail of spray streaming out behind.

Climber Buckhorn on his way to the top of a 250-foot giant to flag the spraying area for the pilots

Checking looper appetites through windowed cages. At the proper stage of growth DDT was applied, and dead loopers rained down by the millions

An amazing thing was taking place almost immediately at the screens down in the dense timber. Men on watch heard the plane go over. And then, within 20 minutes, small green worms, loopers, began to fall onto the white muslin. Nor did they squirm, nor make the least move, once they had fallen. They were quite dead loopers.

At a later spraying the writer saw the astonishing thing with his own eyes. We stood by a two by three foot screen in the deep gloom of the old timber. No sunlight reached us. Then a two-second glimpse of the plane and its white cloud of spray as it went over an opening in

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WE FOUGHT WITH A SAWMILL

The Cry Was For Timber On a Newly-Won Pacific Beachhead — So a Company of Forestry Engineers Goes Into Action

By PFC. A. KRISSOFF

IT is D-Day. This is a big party. Three Army divisions and half the Pacific Fleet are in on it. We're here to stay. On the beach, sandwiched between a crane and a pile of K-rations sit our 20-ton flatbeds hooked onto D-8 Diesel Cats. On the flatbeds, crated and wired, is our not-so-secret-weapon, the Forestry Engineers portable sawmill.

We're waiting for the captain and the technical sergeant. They are making a reconnaissance. They are back now, and the captain waves us to follow. The flatbeds jerk forward and we fall in behind, digging our heels into the soft coral.

We march eight miles. Finally, the sergeant says "This is it," and we fall down on our packs and light up cigarettes. We're up again in three minutes.

Men of the headquarters platoon set up our perimeter, lay a barbed wire defense line and build emplacements for our two machine guns. The woods platoon starts warming up the power saws, whet their axes and yell, "Timber!" as the 80-footers inside our bivouac area hit the ground. Buckers work them into 16- and 22-foot logs and choker setters get them over to the log pile. The mill platoon is easing crates off the flatbeds. One squad unpacks and assembles, another blasts holes for the husk frame and sawdust pits, and still another lines up the tracks.

Two days later the mill squares its first log. The woods are yielding more than 25 thousand feet of timber daily. And our tents, mess hall and supply-houses are ready for occupancy.

The general comes around and we get our orders. He wants piling first. Eighty pieces 40 feet long and 12 inches at the top. That is just for one dock; there's more later. The woods platoon splits up. Two squads and the lieutenant go into the new piling project. Headquarters sends up one squad for our project —producing lumber.

They need bridge timbers first. Six by twelves and eight by fourteens. We give it to them. They need decking—three by six, eight by twelve. We give them that, too. Then it's two by fours, then one-inch flooring, then two by twelves to pile quartermaster goods in the depot.

We give them whatever they need. The captain gets a requisition from the Battalion Construction Group. He passes it to the mill boss, who writes it on the blackboard facing the sawyer. The sawyer signals to the block setter, who makes the cut. Then the sawyer checks it and the boards go rolling down the line to be tallied, loaded and delivered.

We're working 12-hour stretches in two shifts. Later we will switch to 8 hours in three shifts. But the sawmill is always running. We get one day off in fifteen. Later it will be one day off in seven.

But now the woods are giving out. The logs are getting punkier and punier. The fallers are having a rough time of it. There aren't any good-sized boles left. So the mill platoon loosens the belts, takes off the bolts and tears her apart. The woods platoon gathers up tools, cables, blocks and loading gear. Headquarters pulls out tent pegs and folds up all the pyramidals. Then we move 10 miles up the line and start all over again. Monotonous? Sure, but it gets out the lumber and it wins wars.

Four months after we land, the base looks like Camp Belvoir in Virginia. Frame buildings, station hospitals, giant sheds, dumps, offices and barracks. There are roads, recreation halls and movies. We've done our job. It's time for us to go.

"Don't forget to load those flattops on this Liberty Ship," calls the old man to the motor sergeant who is checking all our vehicles.

As if he could! That sawmill is part of us. We swear by it—and at it. We cherish and we loathe it, but it is still our baby. Long may she cut!

Sawmills go way back in the history of our country. In the Army, they date from the closing period of World War I. American troops operated civilian mills in France during the last war as well as during the reconstruction period. From the experience gleaned at that time, Army Engineers organized a new type of engineering outfit to fight in this war. They called it the Forestry Engineers.

The first forestry company was trained and outfitted at Camp Claiborne, Louisiana. The men cut their baby teeth on southern pine, magnolia and gum. Succeeding units were also organized in Louisiana and further trained on the West Coast. From there they spread to every theater of operations. To say the Forestry Engineers have served well is to be modest about it. In all theaters they have consistently won praise and commendation from their commanders.

The men in these outfits are not expert woodsmen or veteran sawmill operators. One of the first to make the grade of sawyer was a New York taxi-driver. Others were restaurant workers, farmers, truck drivers, storekeepers, surveyors, draftsmen and office managers. There was a handful of professional foresters, part-time mill operators and timber cruisers, but on the whole the majority of the men had little mill or woods experience. So much greater their triumph.

The first fully-trained unit went to Alaska to help build the Alaskan Highway. Another went to Africa. Next we heard of them in England, Sicily, Italy and France. In the Pacific, they were in Burma, New Guinea and the Philippines.

Their equipment is simple and expendable. The mill is a portable, belt-fed outfit powered with a 100-horsepower gasoline motor. It carries a 14-foot carriage and utilizes 54- and 60-inch inserted teeth saws. Spare parts are available. Repairs are mostly on the spot. Operational technique is not difficult to acquire.

Besides the mill, the company operates trucks, tractors, power saws, hand tools, winches and other logging equipment. A 20-foot "A" frame on a 10-ton Prime Mover is used to load logs in the woods.

Most of this stuff was designed and built by the men themselves to meet local conditions. Some companies have been able to operate several mills at the same time. Native labor and troop details have proved capable of thus increasing production up to 200 percent. The sawmill also has been used to cut timbers imported from the states to smaller dimension stock. It is often necessary to do this in war theaters.

In slicing eight by eights and twelve by twelves for critical Army needs, the mill has more than earned its keep.

Nor are the Forestry Engineers the sole owners and operators of the sawmill. Navy Construction Battalions, Army Air Corps and Line Engineers have also adopted it, with the aid of borrowed Forestry Engineer personnel. The utilization of the portable sawmill is even now not complete. And it will not be until every engineering outfit has access to one. This state is not far off.

While the operation of the mill during the training period in the States was not without its problems, sawmilling in the tropics proved much more difficult. The boys learned as they sawed. Their observations have been incorporated into our total knowledge of sawmilling and lumbering, and it is by no means an insignificant contribution to industry and science.

For one, woods work was fraught with danger and perplexity. Swamps, mosquitoes and snakes vied with swollen and buttressed butts to make falling a dangerous, exacting job. Infections, falls and skin rashes had to be fought along with Jap snipers.

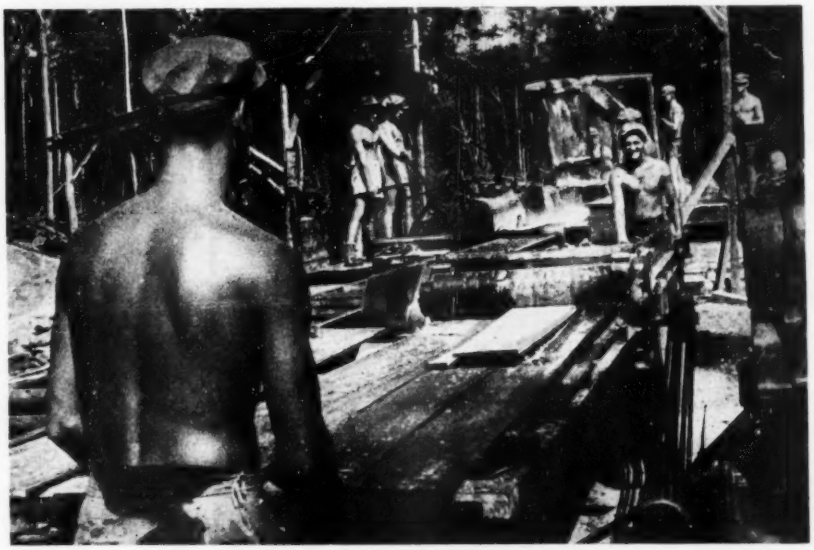
The sawmill gang had its own problems. The timber averaged 40 to 50 pounds a cubic foot—hard wood in any language. The teeth wouldn't cut, the saw tangled with the logs and the pins were sheared much too often. The sawdust was wringing wet and clogged the blower. The carriage was too short for the long logs. The tracks wobbled, the foundation sunk under heavy loads and the cables sagged or snapped.

But with every problem came a successful solution. The teeth were tempered and ground. We built a machine to do the filing. We installed a sawdust conveyor in place of the blower. We built an extension to the carriage and added another dog. We reinforced the rails and put in new foundations. Production increased again.

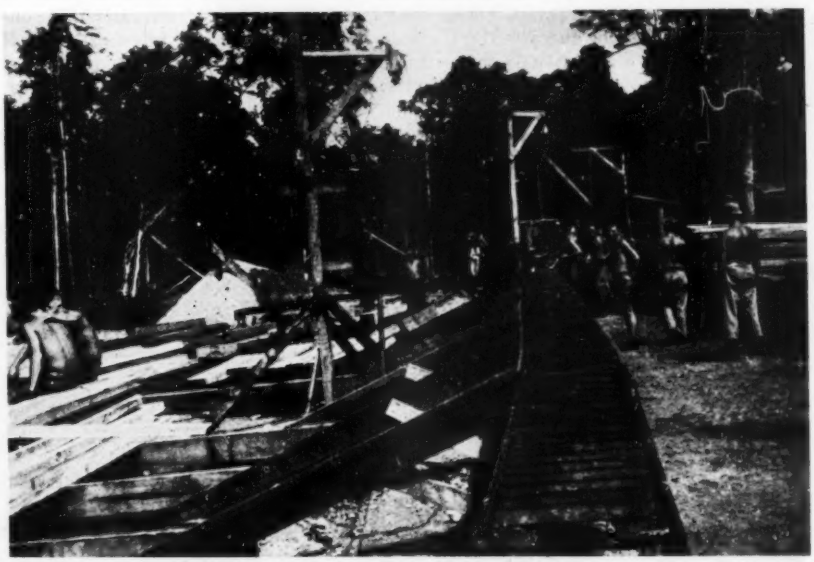
But though forbidding, we found a kind of beauty in the jungle. Monkeys, hawks and lizards were our front door neighbors. Orchids and morning glories brought the same prices on the open markets even though the Army wouldn't permit us to send them home, pressed. The biggest wonder were the trees themselves. Buttressed, thousand rooted, or smoothly cylindrical, every tree was another adventure. There were as many species as there were individuals. We got tired of trying to use the Australian Handbook in identification, and made up our own names. We called the lightest wood "balsa"; the red was "mahogany"; the black "teak"; the large-pored "oak"; the stringy "cottonwood"; and the odorous "cedar." We sent samples back to the Forest Products Laboratory at Madison, Wisconsin, made knocked-down tables for our wives at home and built movie seats that were portable. Not a few of the boys thought of logging a few thousand acres on their own and shipping it to the Chicago market.

The sawmill has become as indispensable as the machine gun and the tractor in modern warfare. It has portability, adaptability and rugged utility. It cuts for soldiers in wartime as efficiently as it does for lumbermen in civilian life. It creates new possibilities in Army construction. It is proof again of the superiority and ingenuity of industry, the people and the Army.

If anything, the end of the war will see further progress in military sawmills, for construction is the biggest engineering task of occupation.



"The jungle was yielding more than twenty-five thousand feet of timber daily, so we gave them what they wanted—bridge timbers, decking, flooring, two by fours, two by twelves. When the logs gave out, we moved ten miles up the line and started all over again"



FOREST SHRINE

The Story of Mount Hermon

By CHARLOTTE MACKEY

High in the California hills, throngs come to wo to st

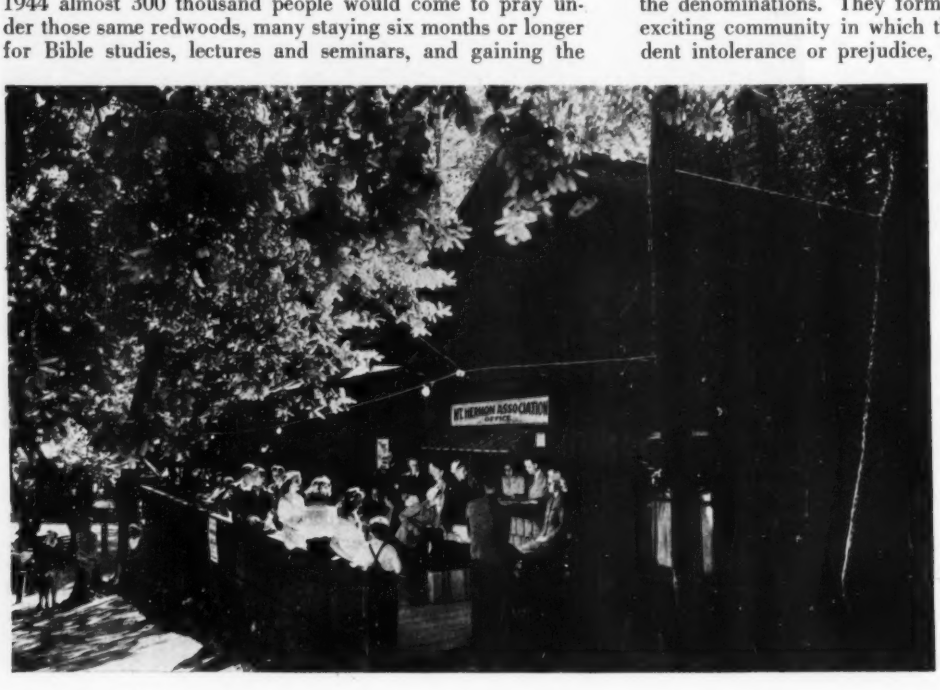
IF EVER the beauty and majesty of a forest reached a peak in human inspiration, it is at Mount Hermon, California, where more than a quarter of a million people come each year to worship under the trees.

The story of Mount Hermon begins in 1841 when a preacher rode up the trail and stopped at the new village of Graham's Sawmill. It had been established as a logging camp, and claimed to be the first Anglo-Saxon town west of the Rocky Mountains, but it quickly became headquarters for a band of marauding thieves. When the preacher appeared, Ike Graham, notorious hellion, roared a warning.

"I never carry guns," said the preacher, "but I am armed with a Bible. In time I'll have more friends here than you."

On that exact spot today is one of the greatest Christian conference centers in the world. Records reveal that the brave preacher "did the next ensuing Saturday night set up a camp meeting under the redwood trees, at which some did pray." But even he could hardly have foreseen that in 1944 almost 300 thousand people would come to pray under those same redwoods, many staying six months or longer for Bible studies, lectures and seminars, and gaining the richest imaginable experiences in inspiration and salvation.

There along Graham Hill road, where the ox-carts of lusty frontiersmen once hauled logs and loot and contraband, pilgrims of another ideal have recently been planning a better postwar world. They are men, women and young people who have demonstrated an emotional balance and a leadership in business and social life. They represent all the denominations. They form an open, gay and somehow exciting community in which there is no carousing, no evident intolerance or prejudice, yet no pressure or restraint.



The youth program is far-reaching and prepares young people for real work in the postwar Christian world

Mount Hermon, named for the reputed place where Jesus was transfigured before His disciples, is in physical appointments, and especially in scenic beauty and climate, a camp of pure superlatives. Noontime air has a slight dry chill, nights require three blankets. Where the preacher put his first small tent temple a century ago is now a "Victory Circle" resembling a small stadium. Zayante Creek, which furnished power for Graham's mill, is now a forest idyll, its rapids and waterfalls sounding quiet melody

wo[illegible] to study at Mount Hermon, the forest shrine

behind the main conference auditorium. Giant madrone trees grow through the floor of the main dining terrace where a thousand or more guests dine and sing in the evening.

Nearby, for a bit higher fee, you may dine in a room which would make any Hollywood or Manhattan night club promoter envious. It has walls of plate glass affording Maxfield Parrish vistas, and through its center flows a mountain stream of rich blue iciness, cascading around rocks and ferns, forming pools where you may feed trout with crumbs from your table, watering trees and vines that reach on up through the roof after creating their fairyland.

Over this and all the 50-odd churches, shrines and Bible halls; over the big administration building and lounge, the postoffice, grocery store, dormitories and several hotels; over the swimming pool, tennis courts and other recreation areas and over the many individual cabins loom the incomparable redwoods. These great trees do more than create an aura of visual magnificence; Old Testament writers drew largely from mountain scenery for their sublime imagery, and so does Mount Hermon. A few redwoods are large enough for groups of worshipers to meet inside their hollowed trunks. And there is pine, oak, eucalyptus and madrone on this sacred mountain in stately jungle-like profusion. Between them on the ridges are views of the open Pacific.

Mount Hermon Association, Incorporated, owns outright a total of 400 acres and the 400 buildings thereon. It is a non-profit corporation launched in 1905 to afford a retreat where Christian leaders might share their ideas before going forth on active crusades. One celebrity (names are never flaunted at Mount Hermon) spent last August there and said: "This place is a streamlined version of the camp meetings our rural grandparents so enjoyed. I can remember riding in a wagon to a forest arbor, camping for a week

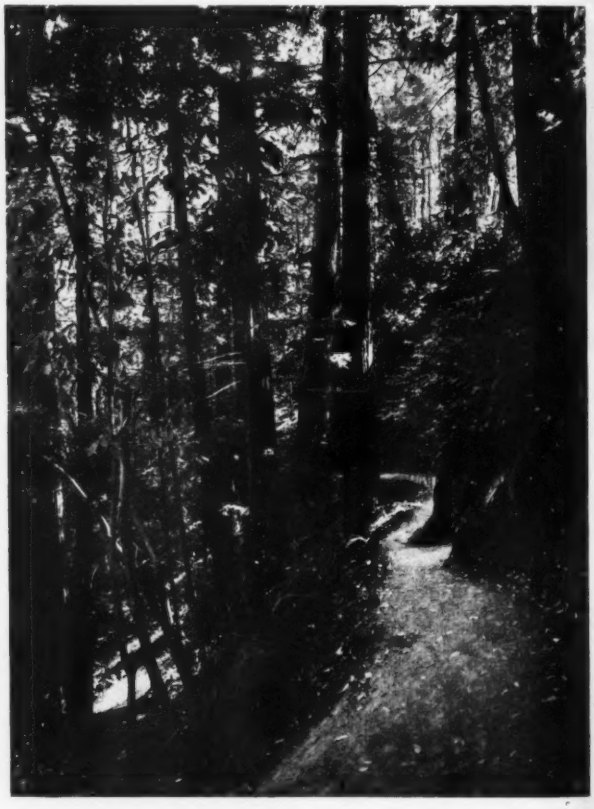
Under towering redwoods hundreds of thousands have found inspiration, rest and renewal

with my parents and attending church three times a day. We loved it. The same consecration, with an even greater inspiration, has enveloped me here. It is a priceless experience."

Original models were the center at Northfield, Massachusetts, established by the great evangelist of the 1890's, Dwight L. Moody, and the center at Winona Lake, Indiana, originated by Dr. Wilbur F. Chapman, Moody's contemporary. Mount Hermon has outgrown both of them. The most distinguished ministers and lay leaders of the church are annually on the faculty, men and women representing all denominations and all of the states. Foremost in this leadership are business men from such cities as Seattle, Portland, Chicago, Denver, Los Angeles and San Francisco. The latter particularly is a financial influence here, with Arnold Gruni-

gen, Jr., socially prominent investment banker, currently the association vice-president and program director.

Actual conversions to Christianity are counted each year by the thousands, and prayer has taken on a wholly new meaning to thousands more. Yet Mount Hermon has been more than a place for contemplation and worship. At the first assembly in 1905, the people under the redwoods said: "An empire is fast building in the West in industrial and commercial lines. We will match it with spiritual development, offering conferences not for mere sermonizing, but for bringing things to pass."



Miles of beautiful forest trails wind through Mount Hermon's woodlands

On the very echo of that statement came the first test. The association had been formed, much land bought and all the money subscribed, when from the depths of hell itself roared perhaps the greatest catastrophe in western history. San Francisco and all the region for a hundred miles around began to quake. That April 18, 1906, the earth split open, homes collapsed, buildings tumbled like domino toys, men died by the hundreds and flames licked out to destroy a great city of wealth and romance. With this destruction went most of the assets of the men who would have paid for Mount Hermon.

But with it, too, disappeared the ugliest traditions of a worldly seaport town. Mount Hermon officials, dramatic as Californians seem always to be, from this moment set out to make the new city a clean and beautiful one. They refunded most of the money already paid in, thus aiding desperate citizens.

But in their same wave of rejuvenation after the disaster they found more money for their project, enough to restore the miles of tunnel that had been destroyed on the railroad leading to the grounds, also to purchase Hotel Tuxedo, a super-roadhouse of the gay nineties. They hauled two wagon-loads of empty whiskey bottles from that hotel, the old timers tell, then rechristened the place Zayante Inn — for a local Indian tribe — and launched their first great series of Christian conferences. There it was that the second point of the association policy was proclaimed: "The church has forfeited a large part of its opportunity with young people, by the dreary reiteration of religious platitudes. We propose here a system of Bible study in careful progression, matching the intelligence of American youth."

In time this youth program was enlarged from one of mere study to include guidance for actual work in the Christian life. Countless decisions have been made in prayer services there under the trees, and their influence is now traceable all over the world. Last September a report came back that a Mount Hermon boy had conducted prayer service on the beach of Normandy within six hours after the first wave of infantry landed. One naval officer came back from the Pacific with these words: "The only teaching in American ideals, the only mention of Christianity ever heard on one of the Japanese islands we invaded, had been brought there by a young couple who had fallen in love at Mount Hermon and there were inspired to enter the missionary field." The association sends no missionaries or other workers of its own; it is solely a place where people of any faith may prepare.

Children of all ages at Mount Hermon conferences and worship services last summer totaled almost 90 thousand. Several conferences saw more than a thousand teen-age youths registered. A few hundred high school boys and girls, chosen for excellence of personality and leadership, form the summer staff. They wash dishes, wait on tables, repair buildings, clean the 15 miles of forest trails, clerk in the association store and butcher shop and handle the garbage. They live in two rustic lodges and have all privileges that guests enjoy.

Combating divorce, preservation of

Soaring trees crown "Pine Ridge," where conference guests are housed in comfortable rustic log cabins

family units and general counsel in family relationships have been major units of instruction there since 1930, with intense follow-up by the separate churches represented. The influence of this has extended over at least six states, notably in the organization of special clubs to afford social outlets for young married couples. In one city this campaign of education and guidance, stemming from Mount Hermon, was credited with lowering the divorce rate nearly 40 percent.

In 1943 California became the forty-third state to legalize "release time" in its public school system—the provision whereby school boards may dismiss pupils one hour each week for special religious instruction by churches. The political strength for this was traceable direct to Mount Hermon planning, and the countless details for actually presenting the instruction have since been threshed out there. The Gideons, an international association of business men for the distribution of Bibles, is aiming

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The "tabernacle" at Mount Hermon, where leading church and lay leaders come from all over the world

ARMCHAIR FORESTRY THAT PAYS

At Harvard Forest, Modern Aerial Photography is Being Demonstrated as a Precise, Inexpensive and Time-Saving Instrument in Forest Management

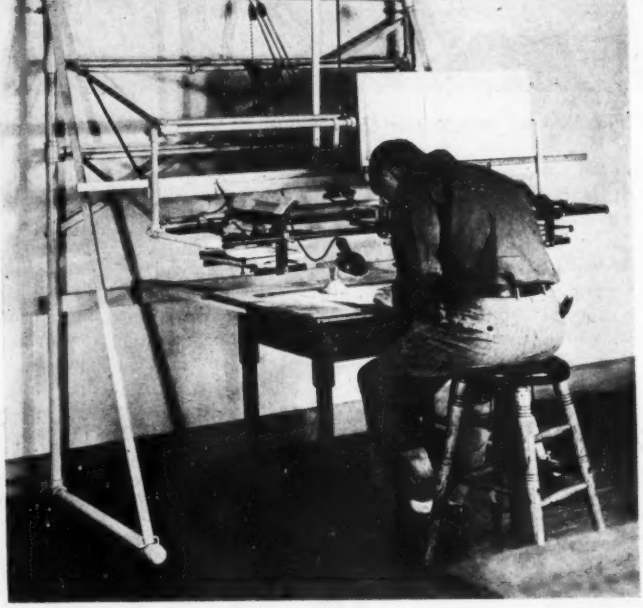
By STEPHEN H. SPURR

WITHIN a few years, armchair forestry may no longer be a term of derision, but rather one of admiration and envy —all because of the modern development of aerial photography. True, the forester will never have to forego the pleasure of getting out into the field, but he will be able to eliminate much tedious bushwacking and yet deliver the goods. With aerial photographs of the right type, a stereoscope and a few other instruments, he will be able to prepare type maps, cruise timber and control forest management operations with increased precision, less time, and at lower costs.

It all started with the first World War which gave impetus to the development of the airplane, aerial photography and photogrammetic techniques. As early as 1920, Canadian foresters began to use the airplane in type mapping, first depending upon sketching techniques, but soon switching to the aerial camera to bring back permanent records of the forest and terrain. Since then, aerial type mapping has been common practice in Canada, and more lately, in the U. S. and in other parts of the world.

Beginning in 1925, various German foresters carried out and published a number of studies dealing with the measurement of tree images on aerial photographs and the calculation of tree volume from these measurements. These studies involved the use of highly complex mapping instruments developed by German photogrammetrists, and, although they represented the first approach to aerial timber cruising, were never carried beyond experimental stages.

Timber cruises of North American timber were first made from aerial photographs in 1929 by the Canada Dominion Forest Service, using simplified techniques designed to cover large areas in a short time with moderate accuracy. In the Canadian method, areas were measured by a planimeter, tree heights by the length of their shadows, and stand volumes were determined from relatively crude stand volume tables. This method, with slight modifications, has been continuously used by the dominion Forest Service and several of the provincial services.



With the multiscope and good aerial photography the forester can accurately type map up to ten thousand acres a day

In 1940, the consulting firm of Mason and Bruce used aerial photographs to control and supplement a ground cruise of a tract of redwood timber. The number of trees on each forty acres were counted on the photographs and timber stands were segregated in three classes according to their average height as determined from parallax measurements, measurements of their apparent height, on stereoscopic pairs of photographs. This was the first extensive use of aerial photographs in this country in which tree images were accurately counted and measured.

Volumetric estimates from aerial photographs were first prepared east of the Mississippi by the Allegheny Forest Experiment Station of the U. S. Forest Service. In 1941, this station used a modification of the Canadian method to survey the timber resources of the Anthracite Region of northeastern Pennsylvania. The principal innovations were the use of dot-grids to determine area, a device previously developed elsewhere in the Forest Service, and the substitution of tree counts for the ocular estimate of stand density used by the Canadians. The project was highly successful, but the accuracy of the resulting estimates was lowered by the poor quality of available photographs and the inadequacy of available mensurational tables.

Since then, in 1943, the Brown Company in northern New England has carried out the first extensive aerial timber cruise by an operating company. They used the anthracite survey method modified to suit their particular needs and the nature of their forests.

(The part aerial photography is playing in the Forest Resource Appraisal of The American Forestry Association is described in the article "Sampling America's Forest Wealth," by John B. Woods, in the December 1944 issue.—Editor.)

Thus, by 1944, aerial timber cruising had been successfully tried in a number of widely differing forest regions on various distinctly different types of problems. Its development, however, had been handicapped by the lack of basic knowledge concerning the relative value

of various types and scales of photographs, their interpretation, their measurement, and the conversion of such measurements into stand volume.

To supply this information, the Harvard Forest has organized and is actively carrying on controlled experimental work in various aspects of forest aerial photography. Cooperating in this venture have been the Fairchild Aerial Surveys, Inc., Polaroid Corporation, Eastman Kodak Company, U. S. Forest Service, Canada Dominion Forest Service and Royal Canadian Air Force. In its first year, this cooperative experimental program has pioneered in the use of infrared and color film in forest type mapping, in the development of a simplified instrument for type mapping from aerial photographs directly onto a base map of a different scale, and in the development of an extremely simple and accurate device for measuring tree heights.

Considering the development of forest aerial photography in the past 25 years, and the extensive use and development of aerial photogrammetry and aerial photo-interpretation in World War II, it seems apparent that we are today at the dawn of an era in which much of forestry will be based upon the use of aerial photographs. Their value, both present and future, to forestry is real and sharply defined.

The most obvious—and the most highly developed—use is in mapping. Modern photogrammetric techniques permit the rapid production of both planimetric and topographic maps from aerial photographs at a low cost and with a high degree of accuracy. In the United States government alone, aerial techniques have become the rule in the mapping work of the Army Air Forces, Army Engineers, Geological Survey, Coast and Geodetic Survey, Hydrographic Office of the Navy, Soil Conservation Service, Forest Service, and others.

An oblique view of the Harvard Forest, above, useful for illustration but not for timber cruising from the air. The infrared vertical of the same area at left, however, reveals softwoods in varying shades of gray—red pine being the darkest—while hardwoods appear nearly white. With aerial photographs of this type and the proper instruments, foresters are able to cruise timber and control forest management operations with increased precision at lower cost

Practically every practising forester has had some experience using aerial photographs in type mapping. Even the casual observer can frequently delineate stand boundaries on aerial photos and prepare an accurate stand map merely by visiting each stand to classify it, relying upon the photographic information

as a basis for determining shapes and areas.

Such use, however, barely skims the surface of the possibilities of type mapping. In the first place, photographs examined stereoscopically will reveal in the third dimension a wealth of detail undiscernible on a single print. Type lines, age-class lines, cutting boundaries, property lines, and many other features stand out under the stereoscope, but are frequently difficult to see on the individual photograph. No forester, once accustomed to the use of the stereoscope, will depend upon any other technique.

Going a step further, tree heights may be accurately measured upon photographs, and the number of trees an acre or other estimates of stand density can easily be obtained, thus permitting more precise type mapping on the photographs, and reducing the amount of checking which must be done in the field. Finally, the use of infrared and color films now permits the identification of many individual species. Experiments recently carried out by the Harvard Forest indicate that practically all softwood species may be identified on infrared photographs, and that hardwoods can be segregated to some extent under favorable conditions. The use of the proper film and filter combination will greatly increase the value of aerial photographs in type mapping.

Identifying forest types under the stereoscope is one problem. Transferring stand boundaries to a map is quite another. Up until recently, the forester has had only crude techniques at his disposal unless he had access to one of the very few complex photogrammetric instruments, highly accurate, highly expensive, highly time-consuming, and highly unsuited to forestry use. Lately, however, simple instruments have been developed which simplify and accelerate this task. Two of these were built by foresters specifically to transfer data from photographs viewed stereoscopically directly onto a map of a different scale. These are the multiscope, developed jointly by the Harvard Forest and the Canadian Forest Service, and the KEK plotter, a product of the Division of Engineering of the U. S. Forest Service.

So much for mapping from aerial photographs. That use alone will ordinarily justify the cost of flying an area. But above that, aerial photographs are being increasingly used in timber cruising. This use is based upon the fact that stand and tree images can be accurately measured, especially when viewed stereoscopically. Measurements of area, whether by means of planimeter, rotometer, transects, or area grids, constitute the most obvious type of measurement which can be quickly and accurately made on photographs. Stand density, too, can be easily determined, either by counting the number of crowns visible in a given known area, or by estimating crown closure in a given stand. On individual trees, crown diameters can be measured with a simple wedge scale, and tree heights can be determined by either the shadow length or the parallax method. With the recently developed Harvard parallax wedge, a very simple device, tree heights can be measured to an accuracy of 5 percent on photographs with a scale of a thousand feet to the inch.

The accuracy of a photocruise depends not only upon the accuracy with which the above four measurements can be made, but also upon the correlation of these measurements with stand volume and timber quality. This is a question upon which research is being actively undertaken, and which will require a great deal of attention in the future. The mensurational aspects of aerial timber cruises constitute the least understood and the least studied portion of the field of forest aerial photography. Experience with emprical photocruises which have already been undertaken, however, indicate that estimates accurate within at least 10 percent, and frequently within less than 5 percent, can be obtained if the photographic work is controlled by careful ground checking.

The third great field of usefulness of aerial photographs in forestry is in management, and here the implications and possibilities are great. At the Harvard Forest, for instance, aerial photographs are currently used to locate roads and trails, to delineate cutting operations, to determine the priority of silvicultural operations in various stands, to plan silvicultural treatments, to locate property lines, to evaluate defoliation by the gypsy moth and, in general, to save many time-consuming trips into the forest. They can be used and are used to locate logging railroads, to evaluate site, to map erosion, to survey damage by many types of insects and diseases, and to plan and administer fire control operations.

The above enumeration may sound very inclusive. It is. Aerial photographs seem destined to become just as much of a forester's tool as the calipers, the volume table, or the Abney level. A word of caution, however, is advisable. Too often, the forester becomes so enthusiastic with aerial photography that he loses his sense of perspective to his own detriment and to that of his work. Aerial photographs have definite limitations and these should be thoroughly and fully understood.

Most important, the value of an aerial photograph is limited by its age, scale, and other photographic characteristics. Old photographs taken at a high altitude and with ordinary film can supply much information of value. But they are surprisingly inadequate when compared with modern photographs taken with increased photographic control, with the proper film and filter combination, and at a scale suited to the needs of the forester. Full values can only be obtained by the forester equipped with up-to-date, high quality photographs designed for forestry use.

Furthermore, it should be realized that the accuracy of photocruises is strictly limited by the few measurements which can be made on aerial photographs. More precisely, their accuracy is limited by the precision with which tree heights, crown diameters, stand density and stand area can be measured and the correlation of these measurements with stand volume. Greater accuracy can be achieved only through careful supplementary sampling on the ground. It is highly improbable that aerial techniques can ever be successfully used independent of ground checking. Rather, they will change the amount and kind of ground work needed. The most efficient timber cruise—that is, the cruise giving the greatest precision for the least expenditure of time and money—will undoubtedly be one in which both photographic and ground techniques are scientifically developed and carefully correlated.

All in all, the future of forest aerial photography is very bright. Its scientific use will permit inexpensive and precise forest mapping, timber cruising and control of forest management operations. What is needed at the present time, however, is objective research to evaluate statistically just what can be done in forestry with aerial photographs, and to find out how they may be most efficiently utilized.

THE TREE PLANTER

Whoever planted rows of trees
Beside the roads and lanes,
God rest his soul in Heavenly peace
And bless him for his pains;
For he who gave of time and toil,
Who gave of heart and hand
To nurse the tender shoots that were
To shade of ways of man,
Was quite as great as those who built
Of stone and minted gold—
No need to cast his name in bronze,
His deeds need not be told.

—Stanley Foss Bartlett

WOODMAN, SPARE THAT "WOLF" TREE!

By CHARLES ELLIOTT

IN ALMOST every sweep of woodland, there is a certain type of tree that foresters call a "wolf" tree. Specifically, this example of avaricious flora is a wide-crowned perennial, towering over and shading out the other trees of the forest. More generally, it is any member of a sylvan aggregation that takes up space which the Maker has ostensibly allotted to one or more of the vigorous, valuable individuals in the forest.

To an eye quick to appraise timber values, or a hand that wields an uncompromising ax in weeding out worthless trees, the wolf tree is a forest ulcer. Its elimination is a strict principle of forest management.

All my forestry books say that! A book I once wrote makes that claim. Perhaps not in those exact words, but that is the general idea. This is not the first time I have ever had to do a reluctant "about-face" and deny an irrevocable truth.

I take the stand as a character witness for wolf trees.

I know a tree that towers on the edge of a wood. Long years ago, when I first met it, this sylvan beauty was erect and graceful, and as pretty as a young girl blossoming into womanhood. Today the ravages of the years show in the seams of its limbs. Its shoulders, slightly stooped, have been worn thin by nature's hardest masters and most worthy friends—the sun, the wind and the rain.

That tree has lived! It is living yet, but the foliage in its crown has dwindled to a handful of leaves, and many of its branches stand withered in the evening twilight. But the march of life and death across the horizon of its existence, the tiny, budding embryos it has nurtured in its bosom, the variety of creatures it has sheltered from cold and storm, are greater in number than any other tree in the forest can boast.

Its lower limbs are within reach of the ground, and I averaged once a week climbing it when I was a boy.

The first spring I noticed the tree, a downy woodpecker had drilled a home into one of its upright limbs. I climbed the trunk to have a better look and

Although condemned by foresters as a worthless space filler, the wide-crowned "wolf" tree is a valuable wildlife unit in the American woodland

half-way to the top found a sheltered hollow, where Boreas or one of his brothers had twisted out a huge limb in the years past.

What a marvelous story the claw and talon marks on the rim of that hollow would have made! The fragment of a gray down feather clung close under a protruding scale of bark. There was a brown splotch which might or might not have been blood. The lip of the hole was worn smooth by furred and feathered bodies sliding across it, and by sharpened claws.

For several years after my discovery, I supervised that old tree in the raising of its families of the wild. I remember squirrels and screech owls and opossums. The first family of starlings in that neighborhood drove away all covetousness of prospective tenants as they noisily took possession. Those original settler starlings have multiplied into a population of thousands.

Once a bluebird timidly selected the site. A marauding black snake drove her away and swallowed the clutch of eggs. I found the snake stretched on a limb above the nest with his belly full of the tiny blue egges in which the mother bird and I had taken so much pride. The parent birds hovered pathetically around. In my anger I hit at the snake and lost my balance on the precarious perch. The snake escaped. I wore my arm in a sling for days.

The foresters call that tree a wolf, unfit to carry its burden in the life of the forest.

Dead and dying trees have a definite place in the ecology of the woods. Without them, many species of wildlife would soon vanish. A recent survey by one of the state agencies proved conclusively that the limiting factor in the raccoon population was the number of den trees available.

Many species of birds and animals use the hollows in trees as homes or as shelters against the elements. Mice, chipmunks and squirrels store them full of acorns and other food against the long winter months when seasonal provisions are as scarce as was a wartime T-bone. Flying squirrels make their homes in the crevices and hollows.

I remember a campfire one night in a group of trees, which the lumbermen had rejected as unfit for the saw. More than a dozen of the little gliding mammals were playing in the woods that night. They would scamper to the top of a tree beyond the fire, glide in a quick silvery arc over the bright flames and flap against one of the tree trunks on the other side. We could hear the miniature claws scraping against the bark as they climbed to the top of that particular tree and, after a moment, see them zip across the fire again.

The different kinds of mammals that make their homes in hollow trees, however, are few by comparison with the numerous species of birds which breed and live in these forest shelters. And birds, we learned in lesson one, are man's best friends in the out-of-doors.

The nuthatches are one group which use the wolf trees of the forest. All species of nuthatches are valuable to man for the multitude of insects they consume.

Den trees are important factors in maintaining raccoon populations

The brownheaded nuthatch will dig his home out of a rotten limb and lay his eggs on a flat nest of such fluffy materials as wool, pine seed wings and soft, shredded bark. The red-breasted nuthatch smears pitch around the entrance to his home. The American bird is close kin to the European red-breasted nuthatch, which seals his wife in with pitch during the period she is incubating their eggs. He leaves a tiny hole in the resin door, through which he passes food and water during the three weeks she is on duty.

The wood duck selects a large woodpecker hole or tree cavity for a nesting site. Unlike most other ducks, mamma wood duck lays her eggs many feet above the water. Naturalists have disagreed since the time of Linnaeus about how the wood ducklings get from the nest into the water. Some say the mother duck transports them through the air on her back or in her bill. Others say she pushes them out of the nest and they drift as gently as a down feather to the surface of the pond or stream if it happens to be below. There are other versions, too, which may or may not be verified.

Woodpeckers are almost universally tree dwellers. In making their homes, some of the larger woodpeckers carve them out of living trunks of the trees. Others choose dead limbs or snags of the forest. They explore the surrounding dead or decaying wood for insect larvae or grubs, their principal source of food. They help protect the living forest tree, those growing into valuable lumber, crossties and veneer wood, from the ravages of forest insects. The number of woodpecker families in a forest is necessarily limited to the number of dead snags and limbs.

Two more consumers of forest insects are the bluebird and purple martin, which make their homes in abandoned woodpecker holes. These two birds are familiar spring and summer visitors to every farm boy, where the wolf trees have been left to attract them.

While the chimney swift makes the most of civilization by using chimneys and abandoned smoke stacks in which to build his nest, in the wilderness he selects the hollow trunks of trees and sometimes the protected surface of perpendicular rock ledges. This mite of a bird, shaped like an arrow's head in flight, builds his nest out of sticks on the inside surface of a hollow tree or chimney. He puts the sticks together with a glue made from the saliva out of his own mouth.

The crested flycatcher is another flying insect exterminator that lives in a tree hollow made and vacated by some former tenant. This superstitous bird makes a cozy nest in the cavity and lines it with snake skin, usually the cast-off skin of some reptile. Naturalists have never determined whether this is a throwback to some prehistoric past, or whether the snake skin is deliberately woven into the nest to frighten away intruders.

These are only a few of the birds and animals which live in the hollows of trees in the woods. The dead, dying and decaying trees are the most interesting places in the forest. Even the wasps and hornets, both eaters of flies and gnats, dig out decayed wood and chew it into the pulp with which they make their papery nests. Many insect species crawl into holes and crevices to spend the winter months.

Those who know its place in the ecology of the forest will agree with me that these ugly wolf trees, these snags, these trees classified as worthless space fillers, are valuable wildlife units in the vast stretch of North American woodland.

BRITAIN'S FORESTRY PLAN

This interesting report on Britain's post-war forestry program was published originally in the London Times. *It is reprinted here by special permission.*

THE announcement that Britain's Minister of Agriculture and the Secretary of State for Scotland are to become jointly responsible for forestry policy foreshadows a new relation of the state to rural land. One object of the change is to secure better coordination of the development of British agriculture and forestry; and since the state now owns large areas of hill land, which may be used either for afforestation or sheep farming, this object acquires a special significance.

As stated in the report of the Committee on Hill Sheep Farming in England and Wales, "the private landowner looks at the interests of his estate as a whole and develops each section according to whether it is best suited for agriculture or forestry," whereas "such organizations as the state at present possesses, by separating agriculture and forestry, tends not to this synthesis of land usage but to its very opposite." During the recent debate in the House of Lords anxiety was expressed lest forestry should become a "sort of Cinderella in the house of agriculture." Lord Selborne gave an explicit assurance that forestry would now be put "in the forefront."

The need for well-stocked woods in Britain has always been associated with war. For four centuries British sailors deplored the scarcity of suitable oak for building ships. In the two great wars of modern times the demand has been less for oak than for enormous quantities of softwood to replace the 10 million tons of timber which in peacetime were imported each year from abroad. Oak and larch are still required for ships, but it is chiefly board and scantlings for buildings, pitprops for the mines, ash and beech for airplanes, wood for packing cases, and a host of other needs that have made the tremendous wartime calls on British woods.

The last war found Great Britain both short of timber and unprepared to make use of the resources possessed. Some 450 thousand acres of the better woodlands were felled to meet war needs; and the public became aware of the danger of neglecting British forestry. As a result of the Acland Report issued in 1918, the Forestry Commission was established as a state forestry department and was "charged with the general duty of promoting the interests of forestry."

Although the Forestry Commission has done a great deal of planting during the past 25 years, its operations were started too late to furnish any considerable volume of timber for the present war, and it has been estimated that no more than 3 to 4 percent of the total volume of usable timber standing in the country at the beginning of the war was the consequence of direct state planting. Timber for this war has again been drawn mainly from privately owned woods, which were ill prepared to meet the drain, since only a small part of the area felled in the last war had been replanted. Moreover, owing to the break-up of estates, many more woods had subsequently been felled. A minority of landowners had diligently cultivated their woodlands and enhanced their productiveness. Through death duties and agricultural depression, however, landowners were short of capital, and private forestry received little encouragement or support.

Yet a large amount of timber has been found in these private woodlands. Expressed in terms of the imports it replaced, home production in 1930 was estimated at 450 thousand tons. In the four years 1940-43 the quantity produced in the main categories of sawn wood and round mining timber was 12½ million tons, and this did not include large quantities of telegraph poles, pulpwood, cordwood, charcoal and firewood.

The present area of British woodlands, both good and bad, is about 3 million acres, of which about one-sixth is operated by the Forestry Commission. The forestry commissioners are of the opinion that about a third of this total is in units too small for economic management. Their ultimate objective of 5 million acres of effective forest would be reached by more intensive cultivation of 2 million acres of the present 3 million acres of woodland and the afforestation of 3 million acres of land at present bare. This could be done in 50 years. When the program was completed British woods should provide about one-third of national timber requirements, instead of 4 percent as before the war. The Acland program proposed the total afforestation by the state of more than a million acres in 80 years; the commissioners' plan represents a rate of planting which is about five times as rapid.

There is an important question of economic priorities involved. The new land required for additional afforestation would be drawn mainly from the area at present classified as "rough grazing." This category extended before the war to some 16 million acres, and it is the proper use of this land which constitutes the chief round of controversy between agriculture and forestry. The advocates of the claims of afforestation argue that the weight of the annual produce from this land if afforested would be as much as 200 times the weight of the sheep which would be displaced by afforestation. They add that since in time of crisis timber can be cut much more rapidly than it grows, an even larger proportion of shipping space would be saved by the preference on "rough grazings" of timber to sheep. Forestry, they continue, would also employ perhaps ten times as many men as sheep grazing, a consideration which, it is suggested, cannot fail to appeal to the Highlands of Scotland.

This is, admittedly, only one side of the case. The advocates of extended agriculture also have a program for the improvement of upland grazing. Moreover, there is a wider economic calculation to be made, at Cabinet level, in the general context of public policy. The acceptance of any competing claim for the use of this land must involve, in addition to whatever gain may be obtained, a loss in the shape of the sheep or other produce which will not be produced. The question which arises is twofold. It is whether in peacetime it is more economical to import additional meat or additional timber; and whether in wartime, when the stored-up resources of both soil and woods are necessarily drawn upon, the difficulty of importing sufficient agricultural or forestry products to make up the difference is the greater. It will be the responsibility of the government to allocate land to agriculture and forestry in the best interest of the nation, and the transference of forestry powers to the Ministry of Agriculture can be a step in the right direction, provided that it does not mean an automatic preference for the claims of farming.

The part which private owners should play in the rehabilitation of the wood-

(*Turn to page* 518)

"CHAMPS" IN THE WOODS

By BUD CORNISH

CHARLIE Miller, one of Maine's top backwoods guides, probably knows more about heavyweight champions from Jack Johnson to Joe Louis than half the men around Madison Square Garden. Remember that gag about the mousetrap—build a better one and people will show up, even in the deep woods? Well, Charlie built his on guiding and conditioning—and the champs showed up!

Running a career as a guide into prominence that even put him into Bob Ripley's "Believe It Or Not" cartoon, Charlie has numbered among his friends —and still does — Dempsey, Tunney, Louis, Baer, Carnera, Braddock, Willard, Johnson and other fighters who have come to Maine for his guidance.

Ripley placed him in a cartoon when Miller snowshoed from Bangor to Boston, a distance of 223 miles, in eight days.

Charlie can't remember who was the first fighter to show up at his camp, but he does know that over the years he's found that conditioning in the Maine woods, if a fighter will follow the Miller plan, is the best way any noggin-knocker can train. Yet he complains that many of them get into the woods and, unless driven, just laze around. He had his most harrowing experience in this line with Primo Carnera, the Ambling Alp from Italy.

One day Carnera decided he wanted to hunt bobcats. "Okay!" said Charlie. "Tomorrow!" Primo began looking around for woolen stockings that were needed in the snowy woods. But the search for size 15, which the giant required, was a case for Sherlock Holmes.

"We spent," says Charlie, "eight bucks calling Bangor and nearby small towns. There wasn't a size 15 anywhere!" He was about to call the whole thing off when one of Carnera's retinue cried, "Jeepers!—find those stockings or he'll be squeezing hands and playing kid games like whack-the-back all day!"

The giant Primo Carnera, shown here with his guide, wanted to hunt bobcats

The solution came. Charlie knew his Greenville, and the elderly Andrews sisters who could knit a blue streak. He hastened to town, bought yarn, then rushed to the sisters' home. "Can you knit a stocking apiece by nightfall?" he asked. The sisters would try, just as a sporting proposition. Next day, Carnera had his size 15.

Of all the heavyweights, Carnera was the most demanding. Charlie found Primo could be kept reasonably quiet by target-shooting so he gave him a box of .22 shells and let him pump away. "Then," Charlie relates, "I awoke one morning to a cannonading behind the camp. I couldn't believe that Carnera, a champion sleeper, was up before the guide. But there he was, banging away at the target. He had found some of my 38-55's and was burning them up because they made a louder noise."

Dempsey was the best hunter among the champions and really enjoyed woods life for brief spells. But he was the panther type—always on his toes, restless, wanting to be somewhere else. "I've taken Jack into the woods," Miller recalls, "and he'd walk back five miles to telephone New York."

Although restless and constantly on the move, Jack Dempsey, at right, enjoyed woods life — was the best hunter among the champions

Gene Tunney also was a good woodsman, though not the hunter Dempsey was, Charlie revealed. "Tunney would prefer to go on long hikes, taking a book with him. He liked to study animals, not shoot them. And he picked up more of a guide's knowledge in a short space of time than any of them.

"As far as fighting is concerned, I can't tell any more than the thousands who are still arguing about these great champions. Dempsey, even in camp, was the slugger, the drive-in scrapper. Tun-

ney was the careful planner in everything, cool and collected."

The cool Tunney, however, was cooler than ever one Sunday when Miller permitted him to go to church alone. Gene stepped on top-ice too light for a heavyweight and plunged into the frigid water. "After that," said Charlie, "I never let him get out of my sight."

The champion with the greatest build and whom Charlie would have liked to have kept in the woods for weeks to toughen was Maxie Baer. "Maxie was a lot of fun," he recalled. "He was always scuffling or making pulled 'passes' at protruding faces. See these teeth? Well, these aren't mine. Baer punched playfully, forgot to pull enough and loosened all three. I'm probably the only guide in the world who ever got hit by the world's heavyweight champion—and lived!"

Maxie liked fishing, and once when he caught a beauty Charlie tipped off a photographer. Maxie posed chestily with his prize, then handed it to Miller to put away. Fish, to Miller, were a dime for twelve, as the saying goes. He promptly gave it to the photographer. Baer hit the ceiling until Charlie said, "Aw, come out to my well." There Charlie dipped up a far larger fish and thereby squared it with Maxie.

"After that," he relates, "Maxie became the most enthusiastic fly-caster in camp. From a short distance he could hit the well every time—trying to land *my* fish."

High on Miller's list is Jim Braddock, who came off the docks and rode to fame in a comeback campaign that finally saw him beating Baer for the title. "There was an agreeable guy, a sport any guide would like, and to me one of the gamest," said Charlie. "He was always the same, and a great family man who really thought the world of his wife and kids. He's johnny-cake with any meal."

Charlie had fun, too, with One-Eyed Connolly, the celebrated gate-crasher, who crashed into a woods-party at Miller's and, of course, became the butt of many jokes. Connolly, however, was seriously put out when he found he'd had his picture taken with what he thought was a rare Penobscot salmon and then discovered it was a huge sucker.

"He later nabbed a good salmon out of my icebox," Charlie related, "and took it to Boston."

Lou Nova trained in the Maine woods —or started there—and Miller feels that he had what it takes to be a champion but that his mind was cluttered up with Yogi. "If Nova had followed a routine, he would have emerged from the woods in better shape, mind relaxed and physically set."

Miller has great respect for Joe Louis, though Joe is no hunter. "I thought it would be good publicity for the state if Louis got a deer while he was in Maine, but he couldn't stay at the camp long enough. So I telephoned the governor and he said it was okay for me to tag one of mine and have Joe's picture taken that way. But the wires got crossed and a game department official said I'd have to pay $15.15 for a license —or Joe would. I paid, though Maine was getting plenty of publicity. Louis didn't forget this, however. For his next fight, I got two seats and a round trip railroad ticket to New York."

Although Charlie specializes in conditioning prizefighters, every now and then other celebrities show up at his camp. He likes to recall the visit of Sally Rand, the dancer.

"I was telling her there ought to be a story in this conditioning business," he related, "and she offered to help me with one—even said she knew an editor. So we got busy."

The story was about the son of a big city banker who had become a worthless drunkard. Charlie takes him into the woods and exposes him to the rigors of nature. After a dramatic struggle, the son conquers his weakness and returns to the city a new man.

"It was a good story," Charlie confided, "and soon I had a wire to come to New York for a discussion. But it wasn't what you think. The editor's wife had read the piece and wanted to know if I would take her old man into the woods. Seems like he was hitting the bottle."

Charlie Miller, the deep-woods guide, loves those woods—but he likes the cities for short periods. He shows up in New York to eat at Dempsey's or stay at Jack's hotel in his old woods clothes. "They expect it," he declares. "Charlie Miller in a store suit would be just another nobody. But in my woods clothes —well, I'm a character!"

As a conditioner of champions, woodsman Charlie Miller is something of a champion himself. He once gained fame by snowshoeing from Bangor to Boston — a distance of 223 miles — in eight days

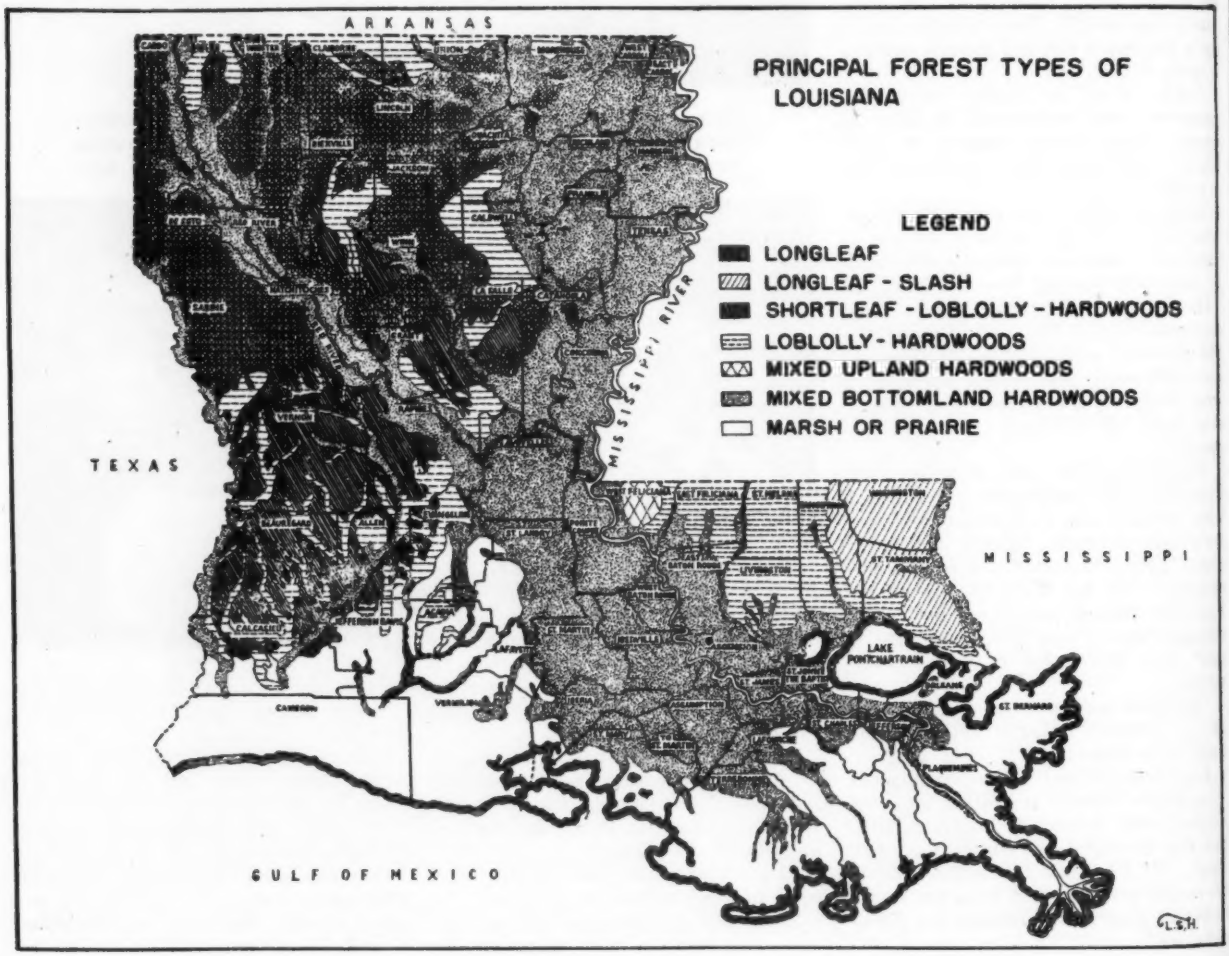
LOUISIANA—SOUTHERN FORESTRY'S PROVING GROUND . . . By ED. R. LINN

THIRTY-ONE years ago Louisiana led all the other states in output of forest products, of outstanding quality and great variety. Longleaf, shortleaf and loblolly pine, tidewater cypress and its companion tupelo, a dozen choice species of oak, half as many hickories, red gum, ash, tulip poplar and other trees of lesser fame, were being hewn into timbers and export deals, lumber, slack and tight cooperage, and countless other shapes for industrial use. Hewn ties, poles and piling, turpentine and resin were produced in quantities great enough to make them economically important.

Daytimes the sky was plumed with black smoke from 200 steam log skidders and the stacks and waste burners of the mills they fed. Night mill crews kept logs moving against the saws, so that the burners glowed redly across the raw cut-overs. Railroads great and small derived much of their revenues from hauling logs and lumber; dozens of big plants squatted along each major line, and in the eastern part of the state, at Bogalusa, a model industrial city clustered near the largest sawmill ever built, up to that time. When 1914 records were added up, Louisana could claim to have converted 4 billion feet of sawlogs into lumber and kindred commodities.

This article previews the findings in Louisiana of the Forest Resource Appraisal of The American Forestry Association. Other states will be similarly presented in forthcoming issues.

Except for the world famed "sugar bowl" west of the lower Mississippi, and chains of bottomland plantations farther up that stream and along the Red River, Louisiana was at that time relatively undeveloped agriculturally. Across its southern side there stretched a wide belt of marsh and "trembling prairie," the home of abundant wildlife, furred and feathered, and presumably of numerous human fugitives. Of the state's 31 million acres of gross area, no less



Blocks of planted pine are separated by protective fire breaks

than 20 million were still tree covered.

In 1945 we find 7,306,358 acres of farm fields and improved pastures, 4,266,783 acres of marsh and prairie, 2,132,533 acres under water, 532,460 acres of urban and suburban, 633,415 acres of special reserves, and 16,183,171 acres of land which is or should be producing crops of timber. And upon this forest area we estimate that there stands a total of 42,725,000,000 board feet of commercial sawtimber, or only slightly more than 10 times the volume of wood cut into lumber and other commercial shapes in 1914.

It is clear, of course, that Louisiana's splendid timber stands took a severe beating during the first World War and for some time thereafter. As of today they are best described as uneven aged cut-over forests, although there are small remnants of thrifty old growth and considerable areas of natural and planted reproduction. More than a million acres of skidder-logged longleaf lands are still barren. Most of the older forests are understocked with trees. Yet notwithstanding all these handicaps, Louisiana continues to produce saleable wood amounting to about half the annual volume of 31 years ago.

Because of their vast extent and the variety of conditions exemplified, Louisiana's forests offer outstanding opportunities to study southern forestry problems and make practical solutions. Certain of her most valuable products are no longer made, because of the almost total exhaustion of old growth pine and cypress. However, during the past several years it has been possible to cut partially defective trees of the more desirable species along with the good and to dispose of many trees of less desirable species so that forestry minded owners have been able to further improve their stands. Today many owners have their forests in better growing condition than ever before.

Since 1918, additional impetus has been given to forest management by the advent of wood hungry mills. Of current pine production, now estimated at 1,262,000,000 board feet a year, 280 million feet, or 22 percent, is pulpwood. This material comes increasingly from young managed stands and from handplanted forests.

Back before World War I the Louisiana legislature, with extraordinary interest in forestry for that day, enacted special tax laws to encourage timber growing. Landowners were enabled to enter into contracts with the state for periods up to 40 years, during which they would be required to protect contract areas from fire and to follow "practical and scientific methods of timber culture" under supervision of the state forester. Lands so covered were to be taxed at reasonable fixed rates, but commercial timber when harvested would yield 6 percent of its stumpage value to the parish (county) and state.

Tax laws similar in principle have been enacted in many states and until recently have proved unattractive to landowners. In Louisiana 28 thousand acres were put under contract in 1913 and for many years the increase appeared disappointingly slow. Yet by 1945 we find that 713,155 acres in 16 parishes actually are being managed under such contracts. And recently there has been increased cutting in these managed stands. In fact, in 1944 nearly 27 million board feet of lumber and 13 thousand cords of pulpwood were cut from contract areas. This growing contribution to the annual wood output of Louisiana attracts the attention of all southern foresters and woodland owners.

Forest planting has been an important activity here. In 1921-22 a lumber company set out a million wild or forest grown pine seedlings and sowed pine seed upon 800 acres of cutover land. In 1923, nursery grown seedlings were outplanted upon 3 thousand acres. Today there are more than 120 thousand acres of pine plantations in 8 parishes. Some of the earlier plantations now con-

Young pine stands are being thinned for pulpwood

tain from 20 to 35 cords of pulpwood an acre. And some have yielded as much as 10 cords of wood an acre, in thinnings. Such facts have a bearing upon the problem of the cutover longleaf barrens, now growing little but mediocre grass and weeds.

Forest areas of the state can be classified in several types. Along the Mississippi and the lower reaches of its principal feeders, and throughout the length of the Red River are mixed bottomland hardwoods. A small area of upland hardwoods is found in West Feliciana parish. Loblolly pine-hardwoods type is widely scattered over the state, often in areas formerly occupied by longleaf pine. The longleaf type is confined to southwestern and central Louisiana, while the mixed type, shortleaf-loblolly-hardwoods, occupies most of the northwest fourth of the state. Two eastern parishes, Washington and St. Tammany, contained slash pine as well as longleaf and still are so characterized.

The vast area of marsh is not strictly a forest type. Some of this wasteland is used as wildlife refuges but most is devoted to raising furs, and so contributes to the state's economy. Leaving the marsh-prairie type out of the picture, one can summarize Louisiana's forests as being 35 percent pine types, 15 percent pine-hardwoods, and 50 percent hardwoods (including cypress).

There is operable timber upon 8,935,228 acres, and poles and scattering sawlog and cordwood trees upon 5,022,415 acres. Clearcut areas adding up to 1,558,325 acres have not yet restocked; much of this must be replanted. There is satisfactory reproduction upon 667,203 acres that were cut over in past years. Upon these lands there stands pine timber estimated at 16,856,000,000 board feet and hardwoods estimated at 25,869,000,000 board feet (International Log Rule, approximating lumber tally).

More than 5 billion feet of the sawtimber volume occurs as poles and scattering trees in reproduction areas. Where stands contain 1500 board feet an acre, or more, they are classed as "operable." Most of the sawtimber is in this category. Expressed in cubic measure the total of wood of sawlog size or smaller is estimated at 16,847,000,000 cubic feet.

While the predominant portion of the remaining pine sawtimber is loblolly, small volumes of shortleaf and of both old and young growth longleaf are produced. The principal species of hardwoods, expressed in percent of the total volume, are: red and sweet gum, 11 percent; tupelo and black gum, 9 percent; oaks (red, white and post), 20 percent; miscellaneous other hardwoods, 18 per cent; cypress, 3 percent.

It is interesting to note that more than 93 percent of all the forest land in Louisiana is in private ownership and so pays taxes. Public lands amount to 6.5 percent, including

Too often the few trees remaining from earlier logging also are taken

slightly more than half a million acres of national forests. A very large acreage is included in river control levees and spillways, game refuges, military and other reservations. State forests and state parks total slightly less than 20 thousand acres.

The character of private ownership deserves mention. Slightly more than 5 million acres is held in blocks of 10 thousand acres or more, by 234 owners. About a thousand owners hold 2,642,615 acres in blocks of 1 to 10 thousand acres. Smaller parcels, down to 500 acres, are held by 1138 owners and aggregate approximately 800 thousand acres. All this indicates a healthy distribution of ownership among the different owner groups. An astounding fact is that 6,617,232 acres, or 44 percent of Louisiana's forest land, is owned by 105,480 people in parcels of less than 500 acres. Such a number of taxpayers, personally interested in the wellbeing of their forest properties, represents a substantial portion of the citizenry of the state.

The large number of small forest ownerships suggests the question of whether there are conversion plants to offer markets for logs and other rough forest products. Louisiana has 496 sawmills, 28 of them capable of producing 10 million board feet or more of lumber each year. These plants and the hundreds of smaller mills are widely distributed over the forested parishes. Ninety other wood-using plants require supplies of various raw materials: cordwood, mill-waste, cooperage bolts, piling, poles, posts and other items. Seven of these are sulphate pulp-paper mills, having annual consuming capacity of a million cords of pulpwood. While most large and many of the smaller among these lumber, pulp and other plants have "back-log" supplies of standing timber, all are disposed to buy logs, pulpwood and other suitable raw materials as needed, for part of their requirements. Often such purchases account for most of their output.

Forest ownership and management offer profits alike to large landowner and small. Results obtained by industrial companies and a few thousand enlightened farmers indicate that such possibilities are real. Handicaps and hazards are no less apparent.

Both in the uplands and the flatwoods, fire continues to be a serious hazard. More than a few such fires are set by stock owners to "green up" the grass, although these incendiarists frequently do not own the land upon which their cattle or sheep are accustomed to range. This situation is aggravated by the attitude of certain landowners who retain title to cutovers because of known or expected sub-surface values, yet are ignorant or indifferent regarding timber growing possibilities and so do nothing with their lands to keep them productive.

Absentee ownership is of important dimensions in Louisiana, and it is doubtful whether the average quality of forest management among such out-of-state owners is comparable with that of the many thousands of others who reside in close proximity to their holdings. It may be found difficult to arouse interest in forestry at long range or when dealing through local agents. Yet the effort should be continued and intensified among this group, as well as among resident owners.

Mention has been made of special land taxation laws, now applicable to 713 thousand acres, or less than 5 percent of the privately owned forest area. Other private forest lands are classified and valued for taxation under three general headings: woodlands (brushwoods that cannot be classed as timberland); timberland (land bearing pine, cypress or hardwoods); cut-over timberlands (land from which most or all commercial timber has been removed).

Values of land and forest growth thereon are combined to arrive at assessment valuations. Assessors are directed to fix values of $2 an acre and up for hardwood and cypress lands and to consider $3 as the minimum acre value for pine land. Where saleable stumpage stands upon the land, it is assessed at from $4 to $10 a thousand board feet for hardwoods; $5 to $10 for pine, and for cypress $6.50 to $11 a thousand board feet. State taxes are levied at 5¾ mills upon full value; local taxes vary from parish to parish and among wards therein, ranging, in 1944, from a low of 14 mills to a high of 48.9 mills, and assessed values may be as low as one-fourth of actual value. Since both the assessments and the rates of levy vary widely, yearly taxes upon forest land range from less than 15 cents an acre per annum (cypress cutovers) to nearly $3 (pine timber), according to their condition and the state of local government finance. With such flexibility in use, and the alternative of reforestation contracts available, it is doubtful that taxation has been a limiting factor affecting forest ownership or management.

Forestry is being practiced upon approximately 7½ million acres of Louisiana woodland. Upon a third of this area logging is preceded by marking so that poorly formed trees and those growing too slowly are removed. Cutting operations are so conducted as to leave residual stands in better condition for growing and producing future yields. Fire protection is afforded, and logging is done with minimum waste or damage.

(*Turn to page* 506)

Power saws reduce pulpwood cutting costs

SILVER FIR

Abies amabilis (Dougl.) Forb.

By WARREN D. BRUSH

SILVER fir or Pacific silver fir, as it is also called, is so named from the striking silvery white appearance of the under side of its needles. Another name applied to it is lovely fir—which *amabilis* implies—because of its beautiful pyramidal or spire-like form in comparison with the usually dome-like crown of noble fir and lowland white fir with which it is often associated. Its pleasing form shows to best advantage in open situations where it is densely clothed to the ground with comparatively short branches. These sweep downward and outward in graceful curves. In thick forests, however, the trunk may be clear up to one-half or even more of its height. Its smooth bark is light-colored, reddish brown near the ground on old trees.

The tree grows to a height of 200 feet with a trunk diameter of three to five feet. It attains its largest size in the Olympic Mountains of Washington, where it is the most common fir. Its range extends from the southern extremity of Alaska southward along the British Columbia coast through the State of Washington to southern Oregon. It occurs near sea level in Alaska and British Columbia and at elevations of from 1,000 to 6,000 feet or more in Washington and Oregon.

Preferring deep moist soil and a southern and western exposure, silver fir is usually found on well-drained lower slopes of canyons, benches and flats. It grows in small pure stands, but more commonly in mixture, usually associated with lowland white fir, Douglasfir, Sitka spruce and western hemlock. At higher altitudes it occurs with alpine and noble fir, Engelmann spruce, Alaska cedar, western larch and western white pine.

The needles of silver fir grow in four irregular ranks along the twig, forming a spray that is flat below and rather bushy above. The upper rows point noticeably forward, toward the end of the twig. Dark green and grooved on the upper surface, the needles are three-fourths to one and one-half inches long, often broadest above the middle. Those on the under side of the twig are longer than those on the upper side. On the lower branches they may be obtuse and rounded or notched or occasionally acute at the apex; those on the upper branches are usually pointed—keenly pointed on leading shoots.

The winter buds are nearly spherical, one-eighth to one-quarter of an inch thick, very resinous, and covered with overlapping lustrous scales. The red staminate flowers hang singly from the lower side of the branches and drop soon after releasing their pollen, while the purplish ovulate ones grow erect in clusters on the topmost branches.

The mature purple cones are conspicuous objects on the tree, measuring from three and one-half to six inches long. They are oblong, slightly narrowed to the rounded and often indented tip. Cone scales are one to one and one-eighth inches wide, nearly as long as broad, and about twice as long as the reddish bracts which adhere to the backs of the cone scales, and terminate in long slender tips. The cones, which mature at the end of the first season, ripen in September and shed their seeds in October. These seeds are

Characterized by its beautiful, spire-like form and lustrous foliage, the Silver Fir grows to a height of 200 feet

light yellow-brown, half an inch long, and have pale brown, lustrous wings about three-fourths of an inch in length.

On stems up to about three feet in diameter, the bark is ashy gray and smooth with large, irregular, chalky-colored blotches and numerous blisters filled with resin. On larger trunks it becomes rougher and irregularly divided into plates covered with small closely appressed reddish-brown or reddish-gray scales.

The heartwood of silver fir is pale brown, the sapwood nearly white. The wood is soft, light, and low in strength properties and in resistance to decay. It weighs about twenty-seven pounds to the cubic foot in air-dry condition, and is used in the form of lumber principally for framing and sheathing in small house construction and for boxes and crates. It is well-adapted to the manufacture of paper pulp but markets for this use are not now available. Recent estimates of the stand of silver fir place the total at 40,300,000,000 board feet, as compared to a total of 121,700,000,000 board feet for the western true firs which includes also white fir, grand fir, red fir, noble fir and a few other unimportant species of *Abies*.

Growth is slow, and trees two feet in diameter are frequently 200 years old. A century is usually required to produce a tree of small sawlog size. Although large seed crops are produced every two or three years, the percentage of germination is low and the vitality of the seeds transient. Moreover, the seedlings cannot develop in continuous dense shade. Like other western true firs, silver fir is free from insect pests and fungal diseases.

Because of the beautifully shaped crown and dense, lustrous foliage, silver fir is cultivated as an ornamental tree in the eastern states and in western Europe. Unfortunately, however, it often does not fully develop its beauty of form when grown away from its native forests. In the East, it is hardy in sheltered positions as far north as Massachusetts.

The name of Silver Fir derives from the silvery white under side of its needles

The bark is ashy gray, with large chalk-like blotches and many resin blisters

The mature cones are conspicuous. Purple, they measure from three and a half to six inches long

Natural range of Silver Fir

Tree Trails . . .

GIANT HEMLOCKS

Largest hemlock on record is this giant in California—a mountain hemlock twenty-one feet in circumference

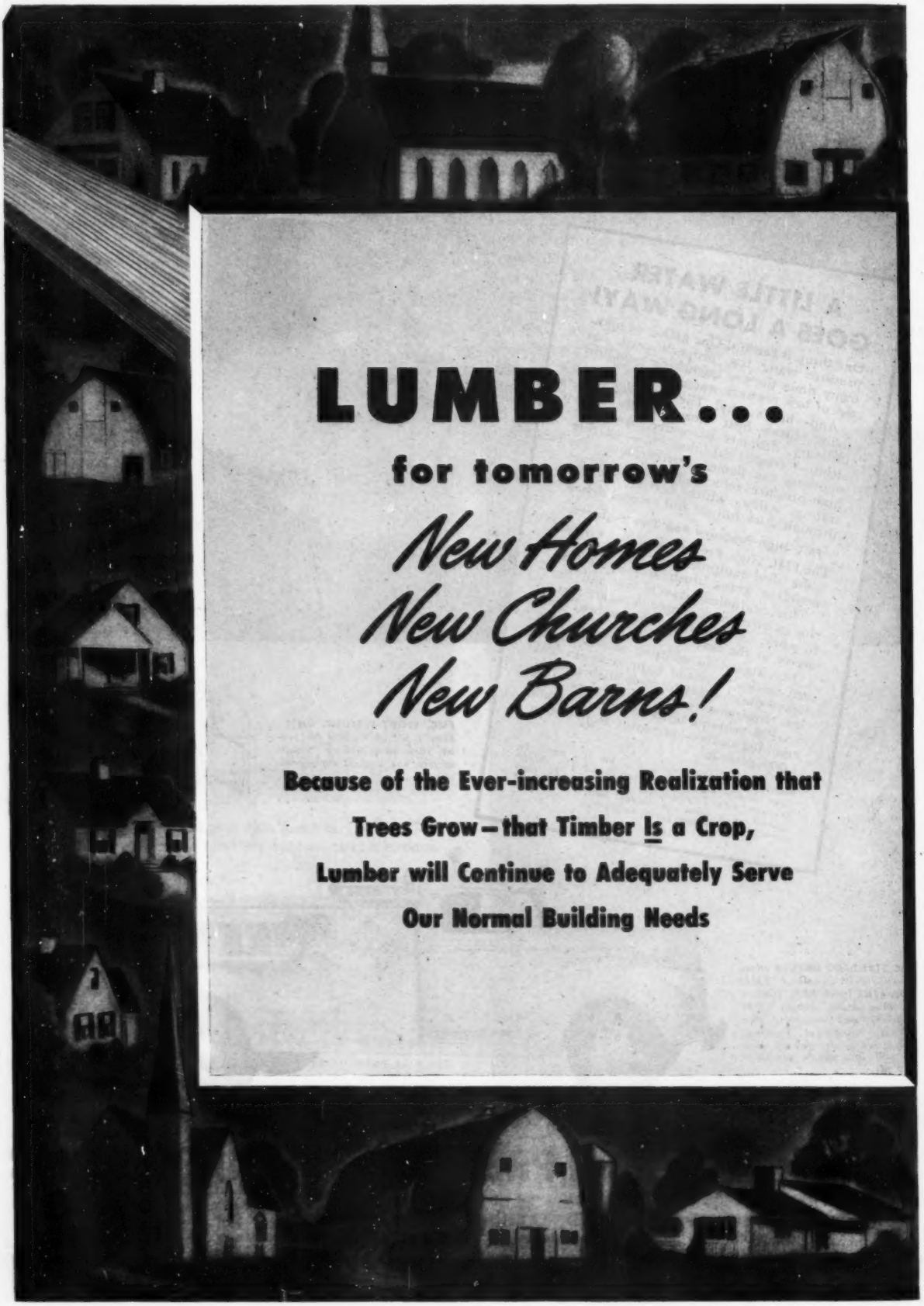
THE largest hemlock on record with The American Forestry Association is a mountain hemlock, *Tsuga mertensiana,* in Lassen Volcanic National Park, California, reported by Park Superintendent J. V. Lloyd to be twenty feet, ten inches in circumference four and one-half feet above the ground. It is ninety-four feet high.

A runner-up is found in a Pacific, or western hemlock, *Tsuga heterophylla,* located in Oregon. According to Oliver V. Matthews of Salem, Oregon, who reported it to the Association, this great tree is nineteen feet nine inches in girth. It is on Bun Creek, a mile and one-half northwest of Beaver, in Tillamook County, Oregon. Another, with a circumference of seventeen feet, five inches, was reported by Mr. Matthews in the upper watershed of Little South Fork of Kilchis River, also in Tillamook County.

The largest Canadian, or eastern hemlock, *Tsuga canadensis,* was reported in Tennessee by Dr. Stanley Cain, of the University of Tennessee, at Knoxville. This tree has a circumference of seventeen feet, nine inches, four and one-half feet above the ground. Dr. Cain places its location in the Greenbrier Section of the Great Smoky Mountains National Park—between Mt. LeConte and Mt. Guyot. It can be reached through Emert's Cove and Greenbrier Cove, east of Gatlinburg.

A great old eastern hemlock—the state tree of Pennsylvania—stands in Fairmount Park, Philadelphia. It is thirteen feet, two inches in girth and 125 feet high. It is called the "William Penn" hemlock, as it is one of several hundred trees which have been suitably marked as having been growing when William Penn reached what is now Pennsylvania 263 years ago.

Champion eastern hemlock, more than seventeen feet in circumference, is in Great Smoky Mountains National Park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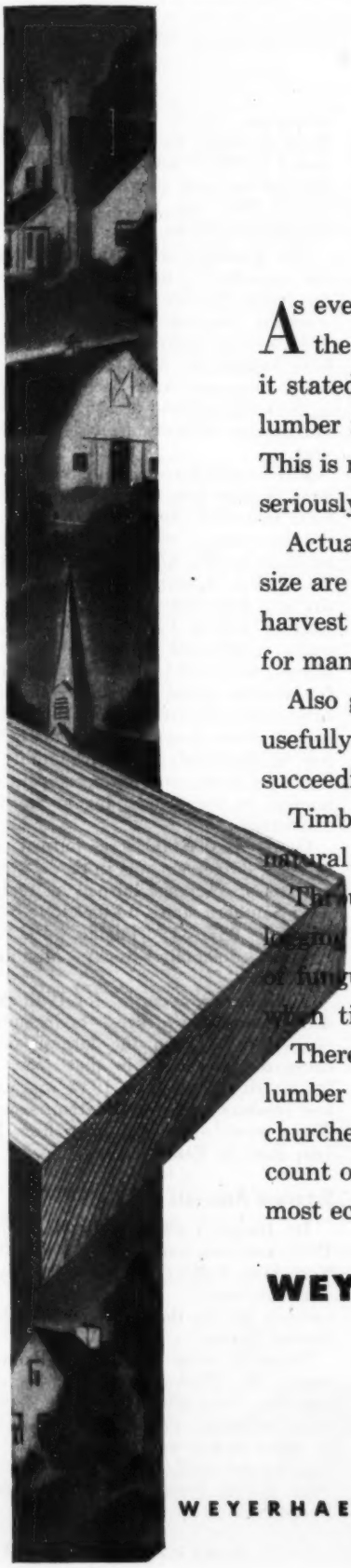

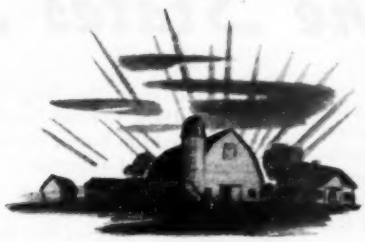

As everyone knows, war needs were consuming the bulk of the nation's lumber production—but we occasionally hear it stated that in meeting extremely heavy war demands, the lumber industry was dipping deeply into its timber reserves. This is not true to the point where future lumber supplies are seriously threatened.

Actually, the nation's reserves of standing timber of saw log size are vast. There is an abundance of mature trees, ripe for harvest and ready to serve America's normal building needs for many years.

Also growing in great profusion are young trees, which will usefully serve the building needs of the next generation—and succeeding generations.

Timber is a Crop. Trees grow. They are our only renewable natural resource.

Through modern forestry management, through planned logging programs, through improved control of fire, of insects, of fungus growths and disease, we are approaching the time when timber growth will equal or surpass timber harvests.

Therefore, you can confidently look forward to having lumber of the highest quality for tomorrow's new homes, churches, farm buildings, and commercial structures. You can count on lumber to continue in its role as America's best and most economical building material.

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Around the States . . .

Colgan Heads NLMA

Richard A. Colgan, Jr., production manager of the Diamond Match Company, Chico, California, has been named manager of the National Lumber Manufacturers Association. He will fill the position vacated by Wilson Compton, who resigned in January, 1945, to accept the presidency of Washington State College.

Born in Berwyn, Pennsylvania, in 1891, Mr. Colgan received his B.A. degree in forestry at Michigan State College in 1913. After brief field experience with the U. S. Forest Service, he engaged in consulting work with F. E. Olmstead until 1918, when he was appointed forest examiner at the Forest Products Laboratory, Madison, Wisconsin. He took up his work with the Diamond Match Company in 1920, devoting his efforts to management of the company timberlands and lumber production. He is vice-president of the Western Pine Association and was formerly a member of the Forest Conservation Committee of the National Lumber Manufacturers Association.

Greeley Resigns; Simpson New Manager of West Coast Association

Harold V. Simpson has been named secretary-manager of the West Coast Lumberman's Association, to succeed Col. W. B. Greeley, who is retiring, but who will remain with the association in an advisory capacity, particularly on forestry. Mr. Simpson has been manager of the Washington, D. C., office of the West Coast Association since 1942.

A native of Oregon, Mr. Simpson learned lumbering from the ground up, working in sawmills and then selling lumber in the New York market. He gained long experience in the lumber export field, including a considerable period of trade promotion in the United Kingdom and South Africa and, finally, as secretary and assistant manager of the Seaboard Lumber Sales Company, Ltd., of Vancouver, British Columbia. He graduated from the University of Oregon in 1923.

Colonel Greeley, widely known in this country and abroad for his distinguished work in the field of forestry, served as chief forester of the United States from 1920 to 1928, when he became secretary-manager of the West Coast Association. With only one interruption—during the period he served as chief forester—he has been a director of The American Forestry Association since 1915.

Graduated from the Yale School of Forestry in 1904, Colonel Greeley immediately entered the Forest Service as forest inspector in California. Later, he became district forester at Missoula, Montana, and in 1911, was called to Washington as chief of the Division of Forest Management.

Immediately after the declaration of war against Germany in 1917, his time was devoted actively to organizing war purchases of lumber and recruiting forest regiments for work overseas. From 1917 to 1919, he was on duty with the American Expeditionary Forces in France, first as major and later as lieutenant colonel of engineers. He organ-

H. V. Simpson

ized forest operations of the American engineer troops and, during his last year with the Army, was chief of the forest section, a duty which involved the direction of 20 thousand forestry troops and 95 cutting operations in France.

Forest Fire Toll Halved

Forest fires last year burned over only a little more than half as many acres of United States woodlands as they did in 1943, according to a report issued in September by the U. S. Forest Service. The figures were 16,549,312 acres burned during 1944 as compared with 32,333,398 during 1943.

Comparable declines also were reported in fire damages to forest land properties and in the number of fires. Total damages for last year were estimated as $25,775,312 against $46,533,380 for the year previous. Total number of fires was 131,229 last year as against 210,326 in 1943.

The decreases set forth in the report are regarded by fire control officers of the Forest Service as all the more remarkable because for years prior to 1944 annual figures of acreage burned have hugged the 30,000,000 mark, forest fire damages have been consistently in the neighborhood of $45,000,000 and the number of fires around 200,000 a year.

Fire control foresters attribute the big gain against fires mainly to these factors: Increased popular appreciation of the importance of forests and forest products to the Allied armed forces in World War II, and recognition of forest fire as a deterrent to the war effort; the wartime Forest Fire Prevention Campaign; improved fire fighting techniques; increased federal and state funds for wartime forest fire suppression and prevention; effective work of fire control organizations despite loss of many key fire fighters and the unavailability of new equipment; and fewer campers and hunters in the woods due to wartime restrictions.

Of the 16,000,000 acres burned over in 1944, 85 percent was in the 11 southern states. Acreage burned by regions was: Southern states, 14,059,469; North Central, 837,734; Pacific, 792,277; Eastern, 569,668; Rocky Mountain, 290,164.

While "cause records" for 1943 show deliberate setting of fires—or incendiarism—to have been the largest single cause of forest fire in that year, the largest single cause in 1944 was careless smokers with incendiarism second. There were more lightning fires last year than in 1943.

Syracuse Appoints Illick

Dr. Joseph S. Illick, acting dean since 1943, has been named dean of the New York State College of Forestry at Syracuse University. He succeeds to the vacancy left by the retirement of Dean Samuel Spring.

Formerly state forester of Pennsylvania, Dr. Illick has been associated with New York State College since 1931, when he became head of the department of forest management. At one time he was on the staff of the Pennsylvania State Forest School and the Biltmore Forest School.

Louisiana,—Southern Forestry's Proving Ground

(*From page 497*)

Approximately two-thirds of the managed area is being given *extensive* management, consisting chiefly of protection from fire where necessary and avoidance of damage to residual stands of unmerchantable trees left for future cutting or seeding purposes. At present 40 technically trained foresters are regularly employed in the industries of Louisiana, while more than 30 others are in federal and state employ. In 1934 there were but 8, evenly divided as between private and public employment.

Louisiana's foresters went to war during the last few years. Before the war the state had 16 technically trained foresters on its staff. As the boys come back activities will be expanded. Industry too has its foresters in the war and the technically trained foresters will increase considerably beyond the 40 as the boys return and others can be obtained.

National and state forests are given management comparable with that first described above. Probably Uncle Sam's greatest contribution to Louisiana forestry and to southern forestry in general is through the work of technical researchers at the Southern Forest Experiment Station at New Orleans. Studies in forest management are carried on over long periods. The Forest Survey is an activity of this station, of immense value to owners and operators in the south and elsewhere.

In addition to management of state lands, the state forester's force is engaged in administering the reforestation tax law, a matter of examining and approving plans of larger owners and helping the smaller ones to practice satisfactory forestry. All such lands are inspected each year. Forest extension or aid and instruction to farmers and other landowners is carried on by a force of 5 technically trained foresters, under direction of the state foresters and jointly supported by state and federal agencies.

National forests are protected from fire by the U. S. Forest Service. In 1944, the state forester maintained protection upon 5,926,400 acres of state and private lands. The assistant state foresters and four district foresters direct the work in the protection areas. There are three assistant district foresters, 67 rangers, 146 fire crew men, 181 fire wardens, 46 towermen or lookouts, 14 office assistants, one law enforcement officer, and two educational assistants.

Possessed of adequate equipment, and well directed, this protection set-up is making an excellent record. In 1944, 2,310 fires burned over 67,880 acres, or 1.4 percent of the protection area. Mechanization, permitting faster response to calls, is believed to have been important in reducing burned over acreage. In 1944, expenditures for fire control totaled $369,351—73 percent for personnel, 7 percent for administration, and 20 percent on facilities.

Causes of fire are changing as education takes hold. Camper and smoker caused fires become fewer, while willful burning, associated with stock raising, becomes more of a problem. In this field education tries to convince incendiarists of the unwisdom of burning, and also seeks public support for vigorous law enforcement. Three-fourths of all fires in 1944 were of incendiary origin! This is a real threat to forestry.

A yardstick frequently used to measure forestry accomplishments in a given area is the comparison of annual wood growth and drain. In Louisiana, it is estimated that yearly increment of usable wood amounts to 597 million cubic feet, while the drain from all causes for a like period amounts to 433.8 million cubic feet. Growth is evenly divided as between pine and hardwoods, but pine predominates in the cut at a ratio of three-fifths to two-fifths.

On its face such a comparison indicates a considerable favorable balance of yearly growth over annual cut. Yet further study of these figures discloses several disconcerting facts. Of the wood cut for manufacture and sale each year, 254.6 million cubic feet, or 60 percent, is derived from sawlog size trees and made into lumber, crossties, cooperage, veneers and the like, while the current growth of comparable materials probably is less than 35 percent of total growth. Expressed another way, current cut of lumber and other material made from sawlogs amounts to 1 billion 500 million board feet, while annual growth in such materials stands at less than 1 billion feet.

Wood of cordwood size harvested and sold as pulpwood is estimated to amount to 66 million cubic feet, which is 15 percent of the yearly drain. This is considerably less than the volume of usable wood obtained each year by growth increment in these size classes. Of fuelwood and material destroyed in the course of land clearing operations, approximately 113 million cubic feet is believed to be the yearly drain. It is impossible to analyze the quality requirements of such cutting but it is likely that some timber of sawlog size is used or destroyed by such operations. Significant points to be noted are that pulpwood, a commodity unknown in the Louisiana markets of 30 years ago, now accounts for a formidable part of the volume cut for sale. Also, this type of material is most susceptible of production increases.

If present management practices and cutting rates are continued, this growth rate can be maintained, possibly increased. Yet, admittedly, growing stocks are inadequate for satisfactory production through growth upon a large part of the forest area. In other words, the tree growing mechanism is working at something less than capacity. Presumably improved management would expedite the full stocking that is so clearly needed.

It is apparent that today's production, while equivalent in volume to half the lumber cut of 1914, is not at all comparable as to size and quality. Such items as fuelwood and timber destroyed in clearing operations were not included in the totals of those days. The lumber cut, which now stands at 27 percent of that which Louisiana boasted at its production peak, tends to shrink still further, while pulpwood output, then unheard of, tends to increase and become more important in the forestry scheme. Yet, in view of favorable growing conditions, good markets, sound laws and excellent state forestry administration, Louisiana should produce far more wood than is now growing there. Under forest management each area should yield sucessive cuttings of material from post and pulpwood size to sawlogs. It is not too much to aim for continuous production equal in volume to that of 1914, although more diversified as to size.

In determination of forest land areas, use was made of reports by the U. S. Forest Survey, U. S. Census and Louisiana Tax Commission, data so obtained being reviewed and brought up to date through use of aerial photographs and locally obtained cutting information. Types and conditions were ascertained from U. S. Forest Survey data, from aerial photos and by checking in the field. Timber volumes were estimated by use of sample plots mechanically spaced on aerial photos and checked on ground. Forest Survey growth and drain data used were revised to fit present management conditions. Acknowledgment is made of helpful assistance of Louisiana Forestry Commission, Louisiana Tax Commission and Southern Forest Experiment Station of the U. S. Forest Service. Forest area and timber volumes here set forth are tentative, subject to further review and correction following completion of special growth study now under way jointly by U. S. Forest Survey and The American Forestry Association.—Editor's Note.

CROWD MAGNET

Philadelphia Evening Bulletin Photo

Men and women stop to marvel at a helicopter. There is something miraculous about a machine that hangs or moves in the sky without wings or propeller. And flies forward, sideways or backward—hovers in one spot—rises or descends vertically, linking air travel with the ground, to make flying an easy step to anywhere.

The helicopter's high crowd appeal was shown (above) a few months ago in a demonstration of the Kellett XR-8 military model at Fairmount Park, Philadelphia, under sponsorship of the U. S. Army Air Forces.

With the ease of a hummingbird, the XR-8 flew in, high over the crowd, and settled to rest in a space only 100 feet square. Then the helicopter soared straight up, backed, swung from side to side like a pendulum, whirled, hovered. Finally it sped forward, at a faster clip than a motor car let loose on an express highway, in complete mastery of speed, height and direction.

Just what the public's keen interest in helicopters will mean in future industrial and commercial uses for this unique type of machine is more than we at Kellett Aircraft can forecast. As the oldest American designers and producers of rotary-winged craft, we consider one of the helicopter's most valuable features something we did *not* design or make—its inherent "crowd appeal," even to a nation which accepts modern streamlined trains and 400 mile-an-hour airplanes without a second glance.

Operating details, including cost and payload, may postpone the widest practical application of the helicopter. However, specialized money-making applications seem close at hand. Kellett Aircraft and other important organizations in the helicopter field are devoting time, money and experience to hasten the day when these craft will meet the expectations of their most loyal boosters — the American public. Kellett Aircraft Corporation, Upper Darby, Pa.

KELLETT HELICOPTERS

◆ ◆ ◆ BOOK NEWS ◆ ◆ ◆

THE AMERICAN RIFLE—FOR HUNTING AND TARGET SHOOTING, by C. E. Hagie. Published by The Macmillan Company, New York, N. Y. 174 pages, illustrated. Price $1.95.

Written by an expert on firearms, this book is for hunters of big or small game or the rifle fan who indulges only in target shooting. Illustrated by both drawings and photographs it is a practical source of information on numerous subjects related to hunting—ranging from the evolution of the modern rifle to the care of game in the field. Shooting positions are described and illustrated, problems of large and small game shooting are discussed and the best types of rifles for various kinds of hunting are outlined.

THE CARNIVOROUS PLANTS, by Francis Ernest Lloyd. Published by the Chronica Botanica Company, Waltham, Massachusetts. 352 pages, illustrated. Price $6.00.

Acknowledged by authorities to be the most comprehensive treatise on the subject since the appearance of Darwin's "Insectivorous Plants" in 1875, this scientific work incorporates the results of twelve years' intensive study. Augmented by extensive laboratory studies, most of the research was done in South Africa, Australasia and North America. Although knowledge on the fascinating subject of carnivorous plants has been previously summarized by various scientists, this is the first fully documented treatment made available to the public.

BLUE ENCHANTMENT — The Story of Crater Lake, by Wayland A. Dunham. Published by the Caxton Printers, Ltd., Caldwell, Idaho. 109 pages, illustrated. Price $2.00 cloth bound; $1.50 paper bound.

As a guide book of outstanding originality, "Blue Enchantment" is presented to anyone who has the vast feeling for the scenic wonderland that is our West. Mr. Dunham has succeeded in giving the facts and describing the beauties of Crater Lake without either the triteness or exaggeration hard to avoid in dealing with a subject so famous and superlative as this.

Particularly commendable is the "magic carpet" method of telling the geological history. Hovering in the air above it, we are witness to its evolution from below the ocean floor as an ugly volcanic mass to an incomparable gem.

An interesting commentary also is furnished by the Indian version, told in unrhymed, chanting cadence. The parallels between the geologic truth and the prehistoric legends are indeed striking.

THE CORNELL PLANTATIONS. Published by the Cornell Plantations Committee, Cornell University, Ithaca, N. Y. 16 pages, illus., quarterly.

A new quarterly publication, "The Cornell Plantations," has just come off the press and is now being distributed from the University. It is illustrated, and contains sixteen pages. Dr. Liberty Hyde Bailey proposed that the old name Cornell Arboretum be changed to *Cornell Plantations* in view of the opportunity for developing a great outdoor research center concerned with all things that grow—plants and animals.

Prof. Bristow Adams is editor of the autumn issue which contains a picture of Dr. Bailey, together with an introductory article written by him. In citing the domain of Cornell and its state colleges, the lands and buildings, livestock and wild animals, and the beauty of the landscape, Dr. Bailey said, "All of them should be accessible and available in a single comprehensive organized plan ... brought to bear in a noble concept of education."

Professor Adams predicted: "To the Plantations will come from all parts of the world peaceful pilgrimages made up of 'friends of the things that grow.'"

NATURE'S WOODLAND WONDERS. Compiled and edited by Glen P. Burns and published by the Allis-Chalmers Mfg. Company of Milwaukee, Wisconsin.

This beautifully planned booklet of fifty-one pages is a guide to one of the most interesting armchair tours a lover of nature could make. While individual tree species, and even many forest types are known to millions of our people, comparatively few are familiar with the curious freak trees and tree formations scattered throughout our timberlands. You will meet the most outstanding here—through their photographs, reproduced in rich, forest green. Brief description accompanies each and, in addition, a miniature line map on which is printed in orange ink the natural growing range of the particular species of tree illustrated. These add much to the interest of the booklet, which will be sent free of charge on request. Write to the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin.

Forests in World Economy

(*From page* 475)

ures does one envisage land use as a whole. Any important changes in the status of one affect the status of the other, for both are parts of the same process—the use of the soil. The very term "farm forestry" implies this integration.

There are ponderable advantages to be gained if, within the structure of government, the administration of agriculture and forestry is organized to emphasize this alliance between the two forms of land use, and to increase public awareness of the need for both in establishing a balanced land economy. Closer integration of agriculture and forestry enhances their mutual effectiveness and makes for the permanence and prosperity of that great class of forest worker and forest owner—the farmer.

Forests in a World Economy

The importance of wood is reflected only in small measure by the capital values of wood industries and the amounts that enter international trade. Of all the wood cut from the forests of the world two-thirds is used chiefly for fuel, but fuel wood builds no industries and rarely crosses international boundary lines. Even processed lumber is consumed largely within the country of its origin, only 10 percent entering international trade as against 60 percent of pulp. Rayon and plastics are as international as pulp; their production has grown with incredible swiftness and the present output has reached the level of wool—20 times greater than the world's production of silk.

So, with the rapidly increasing importance of chemical conversion, wood becomes more and more a world commodity and a world problem. By 1937 international trade in all forest products had reached some 70 million tons, with a value of over 700 million dollars.

The forests of the United States support the fifth greatest manufacturing industry of that country with a capitalization estimated at 10 billion dollars, and give direct employment to 1.8 million workers and indirect employment to another 2 million. Just prior to World War II the gross value of products from the forest was over 4 billion dollars a year, contributing about 6 percent to the national income.

But these figures, impressive as they are in establishing the industrial importance of wood, paint no picture of man's full use of wood throughout the world, and take no cognizance of the social value of forests. Forests cannot be appraised solely as a source of wood—far-reaching and fundamental as that function may be—for they provide a host of public benefits wholly divorced from wood substance; in many regions these benefits transcend in importance and value the role of forests as wood producers.

Over a vast portion of the earth's surface forests are the protecting covers which secure the maximum absorption of rain, control erosion, and make possible the use of waters for irrigation and agriculture. So widespread and important are their beneficial influences in regulating streamflow and providing places for public recreation, rest, and restoration of health, that if wood were to lose all value as a commodity man's need for forests would still remain.

In undeveloped regions not suited for agriculture, forests by their very location may offer the sole possibility of opening up the hinterland, for here economic expansion requires the establishment of forest industry to utilize their products.

Forests are unequally distributed over the earth's surface. Some nations have abundant forest lands, others must depend on wood imports; the distribution of the great commercial forest areas bears no relationship to densities of population. Over 60 percent of the softwood timber upon which the world depends for construction material is in North America and Europe—areas containing only a third of the world's population. China and India, with their teeming 800 millions, possess less than 3 percent of the world's forests, while sparsely populated South America embraces almost 30 percent.

Because of this disparity in the distribution of forests and populations, wide variations exist in forest area per capita. Canada, with 69 acres per person, and Paraguay, with 50, are amply supplied, but India and the Netherlands have less than one acre of forest land per person, China less than half an acre, Syria and Palestine about two-tenths of an acre. Studies in the Ganges Valley demonstrate that this is insufficient to provide even the minimum needed for cooking and for warmth, even at the most primitive levels. As a result of excessive tree-cutting, life among the millions in these crowded countries is forced to adjust itself to the privations imposed by chronic wood starvation.

Even in countries where great timber reserves exist there are local wood scarcities due to many factors, chief of which are inadequate transportation and lack of labor. Peru, with a forest area of more than half its land surface, imports annually 5 million board feet more than it exports. Venezuela, with the tremen-

dous forest wealth of the Orinoco Valley at her very doorstep, continues to import large quantities of wood from the United States and Canada.

In the theory and practice of forestry there is nothing antagonistic to tree-cutting as such—it is, in fact, an essential part of forest management. Foresters have always recognized that land values can be measured only in terms of human utility, and the cutting of forests to make place for agricultural crops or pastureland often represents the highest use to which that land can be put. But where, because of climate, soil, or other factors, the highest land use is expressed in growing trees, forestry holds it basic that when the products are harvested the land be left in condition to insure its permanent productivity.

Indiscriminate forest destruction has had a profoundly deleterious effect, not only upon man's living standards, but upon his very way of life. The entire area of the densely populated Upper Ganges Plain in India was once forested, but centuries of land clearing, overgrazing, burning, and erosion have wiped out all tree growth except for a narrow strip along the foot of the Himalayas. The accessible forests that remain are yielding under management 5 million cubic feet of timber and 50 million cubic feet of fuel per year. With a population of 50 million people, the per capita share is only one-tenth of a cubic foot of timber and one cubic foot of fuel—the greater part of the population gets none at all. In the absence of other fuel, the rural population is forced to burn cattle dung and agricultural refuse which should go to maintain the fertility of the soil.

Even in countries where wood consumption is highest and where vast reserves of timber still remain, the effects of regional forest depletion are reflected in lost employment, insecurity, and social impoverishment. Great areas have been destructively logged and fire-ravaged in the United States until nothing remains but blackened stumps that once were forest, and ghost towns that once were prosperous communities supported by forest industries. With the destruction of accessible forests, the source of livelihood vanishes. Workers were forced to leave their homes and begin life anew; those who remained suffered an insecure existence and year by year sank deeper into social and economic decadence. In this spectacle one sees waste in its very essence—the waste of human life.

The economic and social losses that follow the destructive, nomadic type of forest use now practiced over much of the earth's surface extend far beyond the boundaries of the forests and the site

of the forest industries. With the passing of many a forest region, dependent industries in surrounding areas soon succumb, local taxes rise, and populations become shifting and labor transient. It will take generations to restore a balanced social and economic structure based on stable industries and productive forest lands.

No industry can permanently thrive that continuously destroys the source of its own livelihood. Freedom from want has no meaning where workers face the ever-nearing end of employment. An expanding economy and higher living standards are not compatible with the progressive destruction of a resource that occupies one-fifth of the earth and gives employment to millions.

There are three major avenues of approach to the dual problem of preventing the world's forests from becoming wasting assets and of insuring a continuous wood supply within the purchasing power of the average man. The first avenue lies in technological and industrial advances that may make it possible to utilize a great deal more of the tree substance. The process of converting round logs into square timbers is essentially a crude, uneconomic process of elimination, and the actual amount that emerges as the finished product is a very small fraction of the whole. In North America 27 percent of the volume is left in the forest in the form of defective trees, tops, stumps, and limbs. Ten percent more is bark. The saw converts 10 percent additional into sawdust; slabs and edgings account for another 20 percent. If the boards are destined to be resawn and made into furniture, at least a third of the wood they contain is wasted in manufacture, and as a consequence less than one-fourth of the wood substance is actually used.

These wasteful processes are gradually being corrected. The modern approach regards wood as a raw material for chemical conversion—it breaks wood down into pulp and rebuilds it with a minimum of waste into ever-increasing numbers of end products. All over Europe new industries have been installed to process low-grade and small-sized wood. In Central Europe, where every stick of wood cut is removed from the forest, between 50 and 60 percent of the volume is utilized, compared with 25 percent in the United States. Even the unused material is not thrown away but serves as a cheap chemical raw material: sawdust and waste-pulp liquors are converted into cattle feed, ethyl alcohol, rubber, and plastics. In 1943 Sweden derived some 30 million gallons of alcohol from the waste of its forest industries. These new processes are being introduced in the United States and

Canada, where it is estimated that the waste in forests and forest industries could yield annually as much as three billion gallons of alcohol, equivalent to about 10 percent of the continent's prewar consumption of motor fuel.

A second method of increasing the amount of available wood lies in the literally thousands of tree species whose growth today is largely wasted because we do not know how to process or use them. Three-quarters of the tropical forests in Africa and in Central and South America have no present economic value because satisfactory methods of processing and seasoning have never been worked out, and because their utility has never been ascertained. It has not been many years since western hemlock was omitted from forest estimates in the United States because it was regarded as a weed tree. Now it is used in great quantities as structural timber, for pulp, and even for rayon. Black walnut, once piled and burned as an encumbrance of the soil, today ranks among the highly prized woods of the world. Similarly, as research widens the horizons of knowledge to include the utility of unknown species in South America and Africa, a huge reservoir of wood substance, now wasted or used only in limited quantities for fuel, will be made available.

But the third, and by far the most fundamental means of assuring abundant and continuous wood supplies, deals with the source of supply; it has to do with the protection and management of forests, and embraces all the techniques that go to make up the practice of forestry.

The goal of forestry is continuity of use, for only in terms of human use is forestry meaningful. It seeks to bring forests to a state of high productivity and make that productivity continuous; it seeks to convert wild forests, where growth merely balances decay, into managed forests, where the growth is systematically harvested.

Steps to increase the productivity of managed forests are many and varied, ranging from simple cutting methods that aim only to insure reproduction, to elaborate measures such as seed selection for the development of faster growing species, and drainage to increase the fertility of the soil. Justification of the more costly intensive measures depends on the degree of utilization and on the value of the end product. In Europe, for example, it is economically possible to thin the forests at frequent intervals, thus stimulating growth and increasing both value and yield.

Because of differences in management, forests vary widely in their yields per acre. Compared with an average per-acre yield of 30 cubic feet in the United States, the annual growth in Denmark's forests attains 90 cubic feet, despite the fact that soil and climate are less favorable to tree growth.

The greater the variety of products that find markets, the more complete the utilization and the greater the forest yield. Conversely, where the forest area is exploited with only a single product in view, cutting practices are narrowly confined to certain species, sizes, and qualities—the rest are unused or wasted.

From the standpoint of both utilization and forest practice, it is far better economy to establish diversified industrial plants capable of utilizing all that a forest area has to yield, and base the industry on the resource rather than on the end product. Close utilization and intensive forestry integrate and support each other. Close utilization makes possible more intensive forestry, which in turn results in greater volume of forest products, and the two processes form a rising spiral of effectiveness. Such a situation is beginning in Scandinavia, where forests are no longer exploited for lumber but for wood. In the past twenty years sawmill concerns have added pulp mills, plywood factories, and chemical by-products plants to their original lumber installations and have thus succeeded in securing outlets for all classes of material that make up the forest crop.

A managed forest, with its continuous flow of wood and its recurring needs for silvicultural treatment, offers employment to far more people than a

forest that is being mined. In Denmark 750 thousand acres of forest furnish employment for about 6 thousand people, or one worker to 125 acres. In Switzerland the 1.7 million acres of public forest give work to nearly 10,000 full-time and about 30 thousand part-time employees, an equivalent of one full-time worker for 100 acres. The forests of the United States, which in 1936 gave direct and indirect employment to about 3.75 million people, would, if put under management, give employment to over 6 million, and raise the annual growth of wood from 11 to 21 billion cubic feet a year.

Yet in spite of the proven social and economic benefits that managed forests provide, today less than 15 percent of the world's timberlands are being handled as a renewable, continuously reproductive resource. Twenty percent additional receive some degree of protection but are still regarded as a timber mine, and by far the greater part—about two-thirds of the world's forests—receives neither care nor protection.

This was perhaps inevitable, for historically nations travel the same path in dealing with their forests. In countries of abundant timberlands and sparse populations, all energies are directed to exploitation and a reckless use of what nature has so abundantly provided. Waste under these conditions is very great, and close utilization does not pay, but as populations grow and industry expands the demand for raw material increases and the scarcity of forests makes itself felt. Then, and not until then, arises a slow, reluctant awareness of the need to protect and restore the forests.

Out of this need forest management is born. It is a child of necessity, but history has well demonstrated its ability to repay the cost of adoption.

Governments have a special and, in some ways, a unique position with regard to forests. This is true not only because of the relative length of the forest production cycle, which may extend over generations between outlay and return, but also because important public interests are frequently involved. These interests include such issues as the protection of watersheds, soil conservation, and preservation of scenic and recreational areas.

A recognition of this responsibility of government has led many countries to retain large areas in public ownership. The United States has a federal program of extensive purchase of forest areas. In that country national forests have been largely confined to residual holdings in less accessible regions, where wood production is slow but the protective and social values are great. About 90 percent of the potential timber-grow-

ing capacity of the United States is in private ownership, and only 20 percent of the cutting on these lands is carried on with due regard to continued productivity and future crops. In Central and Eastern Europe, as the result of expropriation and land reform following World War I, 30 to 50 percent of all forest land became publicly owned, and after World War II this proportion of public ownership almost certainly will be sharply increased.

Regardless of ownership, vigorous governmental leadership has always been necessary to insure adequate forestry measures, and in many older countries governmental responsibility is recognized over privately owned forest in order to protect public interests. Safeguards have been afforded the vast majority of European forests, but for the greater portion of the world no safeguards yet exist.

The need for public action to protect forests where social influences combine with production of a valuable raw material, creates a situation in which the Food and Agricultural Organization could be particularly useful in seeking to influence governments and in assisting them to coordinate their public control activities before destructive processes result not only in the loss of forests but in irreparable impairment of the soil.

Just as governmental leadership has resulted in securing higher yields from forest growth, the same leadership in industrial research has resulted in securing higher yields from forest products.

Forest management and wood utilization are two sides of the same coin, and their integration produces a unified result — more abundant forest products. In Europe and North America a profusion of low-priced forest products would bring about far-reaching benefits, but in countries whose people are practically without wood the benefits would be revolutionary.

Next to adequate food is adequate shelter, and ample wood means better homes. It means a new abundance of commodities within the reach of all, employment for millions of workers, outlets for billions of dollars in capital equipment, and the establishment of industries and communities that need never live beneath the shadow of impermanence. Out of continually productive forests man can draw upon a renewable source of richer living, comfort, and security.

Forestry a World Problem

During World War II several European governments preparing programs for the postwar reconstruction of their countries were confronted by the fact that the available wood resources of the Old Continent would be far from sufficient to repair the damages of warfare. These governments recognized that if their own forests were to continue as permanent resources, the annual cut would have to be reduced for years to offset the destruction wrought by war and the Nazis. Accordingly, they sent out purchasing missions to make inquiries regarding the availability of wood resources in the Western Hemisphere for the reconstruction of Europe.

Results were disquieting. In South America they found that lack of transportation and labor, coupled with an almost complete lack of knowledge regarding the utility of many tropical timbers, precluded possibilities of immediate help. In North America, where forest destruction had greatly reduced timber supplies, the purchasing missions

met with a general reluctance to make widespread commitments. Moreover, both the United States and Canada had already received requests for wood from Australia and South Africa, and immense quantities would be needed for reconstruction and development in China.

This experience emphasized an important economic fact—forests have ceased to be a regional problem. The reconstruction of war-devastated Europe, the afforestation of the Far East, the opening up of Africa's and South America's forests, the rate of timber depletion in North America, are all parts of the same picture. The bombing of the Rhineland may result in new sawmills springing up on the Amazon; a severe forest fire in the northwestern United States may profoundly affect the construction of a Chinese railroad. Forest problems overflow national boundaries and involve factors which nothing less than a world organization can define and enable the nations to plan and coordinate. All nations, in varying degree, have been affected by the war, and no return to the prewar situation is possible. If a repetition of the past interwar chaos is to be avoided in wood trade, an immediate appraisal of world forest resources and world requirements is called for

But adequate wood for the rehabilitation of war-torn countries is not the only problem calling for international action. There are the broader tasks of securing the maximum service from forests and forest products throughout the world, in conformity with FAO objectives for raising the general level of living standards.

The major classes of problems that will confront FAO's member governments, and in the solution of which FAO's assistance should prove useful, may be briefly listed here:

(1) Restoration of Europe's war-depleted forests. The task will involve a progressive resumption of balanced production and the attainment of more complete utilization.

(2) Extension of sound management in countries whose reserves of old timber are in process of depletion.

(3) Afforestation in regions whose forests have been wholly or partly destroyed, such as southeastern Asia and the Middle East. Here, restoration of forests is one of the indispensable steps toward soil improvement, more efficient agriculture, and higher nutrition levels for almost a thousand million people.

(4) Initiation of forestry measures in the largely unexploited wood-surplus countries, as in Latin America and Equatorial Africa. This may include the inauguration of public forest policy and

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research, education of trained personnel, and the development of forest industries based on the concept of forests as a permanent, renewable resource.

(5) Effective distribution of forest products. Wood balance sheets, published at frequent intervals, could greatly facilitate that objective.

(6) World-wide correlation of the results of research in forest production and wood utilization.

(7) Coordination of forest production and utilization with soil and water conservation as well as with other land uses and services, such as wildlife and grazing.

For the solution of these and kindred problems, a body of world statistics is the indispensable first step. But the goal lies far beyond the initiation and dissemination of statistics. An international forestry organization must stand ready to undertake missions and to make universally available the results of investigations into silviculture, management, and utilization, and must be prepared upon request to advise the nations concerning their forest policies. It should provide the most direct and practical means of assembling information about wood-surplus and wood-deficit countries and, since it is both governmental and international, its findings should enjoy the prestige needed to win general acceptance.

Applied on a world scale, the combined effects of better forest management, more complete utilization, and the industrial use of new timber species will go far beyond the mere prevention of wood shortage—it will make possible a universality of wood use greater than anything mankind has ever known. Parallel to FAO's plan of "adequate food for all," nothing less than adequate wood for the peoples of the earth will absorb the forest products flowing from such a program. As part of the world-wide campaign against poverty to which FAO has pledged itself, the effective use of the world's forests has an indispensable and permanent function.

Forest Shrine

(*Continued from page* 485)

now at placing a Bible on the desk of every school teacher in America for voluntary reading by the pupils. They organized their western campaign in 1944 at Mount Hermon. The Christian Business Men's Committee of the West, which has given counsel to literally hundreds of thousands of service men, meets frequently at Mount Hermon for detailed report, conference and prayer. This committee includes several of the wealthiest and busiest business men of America.

If New York has a distinguished church or lay leader in Christian work, he is likely to be invited to Mount Hermon, and the records show that he is likely to come. Noted leaders, men and women alike, have come from most of the states and from Canada, serving without fee. This policy started when the great Dr. Reuben A. Torrey led the conference there nearly 40 years ago. He was an evangelist of the Dwight Moody and Billy Sunday era, renowned even in Europe. A more recent enthusiast is R. G. LeTourneau, the noted manufacturer of heavy road machinery, and his personal story is a classic there today. In the prewar depression, it is told, Mr. LeTourneau sunk to a low financial ebb. In prayer under the redwoods he asked humbly for restoration, promising to devote any future assets to the Lord. The answer came in an almost fantastic prosperity, and his promise has been kept. His generosity accounts for part of the present glory at Mount Hermon. And there have been others of his kind.

The association has weathered all sorts of financial and physical difficulties besides the earthquake, and at this moment has a 10-year plan of almost staggering magnitude. In 1920 it was debt free for the first time, but the following year its Zayante Inn burned down. Since then an entire new set of administrative, conference and residential buildings have been erected, and outgrown. In 1944 it was necessary to turn away as many conference guests as were accepted, due to insufficient accommodations.

In 1929 a forest fire swept up the Santa Cruz Mountains with Mount Hermon directly in its path. While men fought the blaze, women and children maintained prayer service for 24 hours. Miraculously, the fire roared to a line within three feet of the Mount Hermon property and there stopped cold.

Postwar expansion of service seems assured now through the energy of a young administrative head — Cyrus N. Nelson, a Princeton graduate who served in a Hollywood church and looks like a Hollywood movie star. He has the Californian's peculiar genius for dreaming audaciously, then doing the work of crystallizing those dreams. A Bible college and a television station on the mountain where Ike Graham pioneered are but two details in his dreaming. About Mount Hermon and America as a whole he is incurably optimistic because he thinks the war has brought a spiritual awakening. And, he says, "no man or institution ever goes to destruction on its knees."

Britain's Forestry Plan

(*From page* 491)

lands devastated by war demands has been the subject of controversy. Nearly every country in Europe has some system of the state stimulation of private forestry. Under the "dedication" scheme, which the forestry commissioners have proposed for Britain, owners of sizable woodlands would undertake to work them under management schemes approved and supervised by the government, and would receive, in return, money grants. If owners failed to dedicate their woods within a reasonable time, or did not maintain a minimum standard of efficiency, they might be compelled to permit the state to acquire them for national purposes. This scheme for ensuring effective management has already been accepted by the representatives of private owners, who are themselves anxious to see the utmost development of British woodlands.

In their recent report the Royal Scottish and Royal English Forestry Societies welcomed this proposal. But they questioned the suitability of the administrative structure proposed by the commissioners. The fear is that many owners may be constrained to hand over their woods to the state and that such a transfer might destroy the economic efficiency of estate management. The alternative which they propose is a Forest Authority which may handle the task with more sympathy and understanding than has perhaps been shown hitherto by the Forestry Commission. They stress the value of education and research as instruments to enable private forestry to do its job properly. Their case is strengthened by the fact that the state forests will be their chief competitor in the marketing of woodland products.

The owners of private woodlands are likely to welcome the transfer of authority to the Minister of Agriculture and the Secretary of State for Scotland, who have a long tradition of assisting private cultivators, and may be better able than an independent Forest Authority to hold the balance between the claims of private enterprise and those of a state department operating in the same field. If the full program of the commissioners were to be adopted, employment in forestry might rise in time to over 50 thousand skilled woodsmen, in addition to perhaps four times as many in forest industries, and thousands of men will have to be trained as forest officers, foresters and foremen. The opportunities of forestry as a career are apparent. They are only limited at present by doubts about both the conditions of pay and work and the chances of promotion, in an occupation where the openings for workmen to rise to executive positions, requiring specialized qualifications, are not yet large.

The commissioners estimate that their program may involve the state in an expenditure of £41,238,000 in the first 10 years. A large part of this might be financed by borrowings as it will be an investment which should earn 3 percent compound interest. And the cost will be further justified by the rewards of security and increased rural prosperity.

Forest Exchange

(*From page* 466)

titled, "Europe's Forests After V-E Day." It was of special interest to fellows who have been over there.

There has in recent months been some discussion regarding the contribution the forests of the United States are to make in the reconstruction of Europe. The amount of timber we intend to contribute for houses in England, for docks in France and Belgium, and for cantonments in occupied Germany, etc., is not a large portion of our total production; nevertheless, considering the difficulty industry is having to maintain its high production figure, and knowing that the demands during the next few years will be as great or greater than the past several years, anything we can do, even in a small way, to alleviate the pressure on American forests and forest industries will help considerably.

It is my belief that we can spare our forest resources to some extent by substituting German products for the rebuilding of Europe. I have read that the Germans have overcut their forests in order to carry on the war. I am not too well versed on the present forest situation in Germany, but it is my impression that there has been very little overcutting in Germany proper. I was amazed at the size, quality, and amount of German forests still intact at the end of the war. I believe, from what I saw, that France, Austria and Poland suffered more forest devastation by the Germans than did Germany.

I understand that a group has been dispatched to Germany to make an inventory of existing resources of the country, but I have heard no specific mention of a forest resource study or inventory being made. We should obtain such a record, and from this information al-

locate to England, France, Belgium, etc., certain available quantities of timber. The Germans need very little for themselves, as present plans do not call for a reconstructed Germany beyond necessities. If the Germans maintain their prewar housing standards, very little wood will be used since brick, concrete and mud are most popular. Even if Germany did feel the pinch for timber, I doubt whether we would be inclined to shed tears in her behalf. In any case, it would be but a temporary shortage, for the Germans would waste no time in reforesting cutover lands.

I would therefore advocate an overall coordinated plan for the utilization of a greater share of the commercial forests of Germany by the Allies—not picking away at small areas as we are now doing. Utilization by the Allies would act as a small partial payment for reparations, would eliminate the necessity of processing and shipping of already overcut American forests, and would be definite insurance that the timber of the Germans will not again, at least in this generation, be used as a reserve of war materials.—*T/5 Edwin J. Jankowski*, Camp Swift, Texas.

Loopers

(*From page* 479)

the treetops. We smelled nothing, felt nothing. Twenty minutes passed, and in that brief time the unseen, unfelt deadly mist must have permeated to every last nook and needle of the woods, for we saw a fat, green looper fall to the white screen, then another then a dozen at once, and at last a rain of loopers hit the cloth. It was enough to give one the creeps. Using tweezers, we counted the harvest of the dead; it totaled 360 loopers on this surface of six square feet. Other counts elsewhere in the area ran as high as 480 loopers to the screen.

All of this happened so quickly, so silently, yet so manifestly that we could do little but wonder. It seemed incredible. Looper-Killer Furniss said that the average number of dead loopers, after one treatment of DDT, was better than 4 million to the acre.

The arsenate of lead, used on other areas, killed the loopers just as dead, but more slowly, for the worms have to eat the lead poison. They don't have to eat DDT; all a looper needs to do is to touch a twig or needle on which the invisible film has formed, and he is as dead as if electrocuted. DDT is indeed third-rail for loopers. Just why they die instantly on contact not even the Bureau of Entomology pretends to know.

Another astonishing thing about DDT is that a pound of it will cover an acre

of this great forest. And this means a cubic acre, one to reach from the tops of the trees to the stalk of the lowest fern on the ground. Imagine a house 208 feet wide and long on the ground, and just as high, and it would contain the kind of space that one pound of DDT and two gallons of fuel oil makes safe from hemlock loopers.

The danger of using DDT in the woods, in relation to wildlife, has been given much publicity. It is true that the chemical could be used in such strength as to kill all life. In the case of the present spraying in Oregon, however, the mixture killed only the loopers and a few other kinds of bugs. No birds were affected. No fish died, nor bees. Myriads of mosquitoes sang and bit as we watched the dead loopers fall. It appears, indeed, that the hemlock looper will die from a mixture not strong enough to down a mosquito. For this hair-line attention all credit is due to the U. S. Department of Agriculture men, who figured it out through some devilish incantations of their own.

The writer saw much of the affected region. The worst portions of it are dismal enough already—gaunt, brown, silent, ready for the wood-eating bugs and fungi which will attack the trunks, if the trees are not promptly salvaged. In one such area he made a special trip to see "The Tree." This is the greatest sight in all of the vast woods of Oregon, a sort of Empire State Building of the forest, and it is one that comparatively few men have yet laid eyes on. It is the biggest Douglasfir on the face of the earth, and it stands in all its mighty age on a difficult ridge above Klootchee Creek, far off the traveled road. This monarch too had been attacked by the looper, and it received a spraying of DDT first of all, for men who have seen "The Tree" would grieve to have it die.

Discovered in 1941, "The Tree" spans 48.68 feet around, at breast height, and is 15 feet 6 inches in diameter. It is likely a thousand years old. It is the only Douglasfir on this ridge, but close by is one of its fellows, prone and rotting these past 150 years. All around "The Tree" are Sitka spruce and red cedar and hemlock, saplings in comparison, none of them more than 9 feet in diameter.

The looper infection of "The Tree" was only slight, and the DDT has doubtless saved the big fellow. The Crown Zellerbach Company has set the whole ridge aside. No ax shall touch it, and when times are more favorable, a road will be made to the base of the noble giant and the ridge made into a park for use of the public.

As for the over-all fight on the loopers, results cannot be known with certainty until 1946. Next month, in October, the moths will appear again—those that survived—to lay their eggs, then to fly briefly, and die. In June 1946, men will check on the loopers again. After what we saw happen on that spread of white muslin it seems doubtful that June a year hence will reveal many of the humpback green worms.

Already killed, but still good for lumber if cut at once, 40 million feet of timber will be logged this fall and winter. If the loggers are not obliged to operate in dead timber still another year or two years, or five years more, it will be because of the thoroughness of the swift counterattack, and the lethal properties of the invisible and all but incredible new poison.

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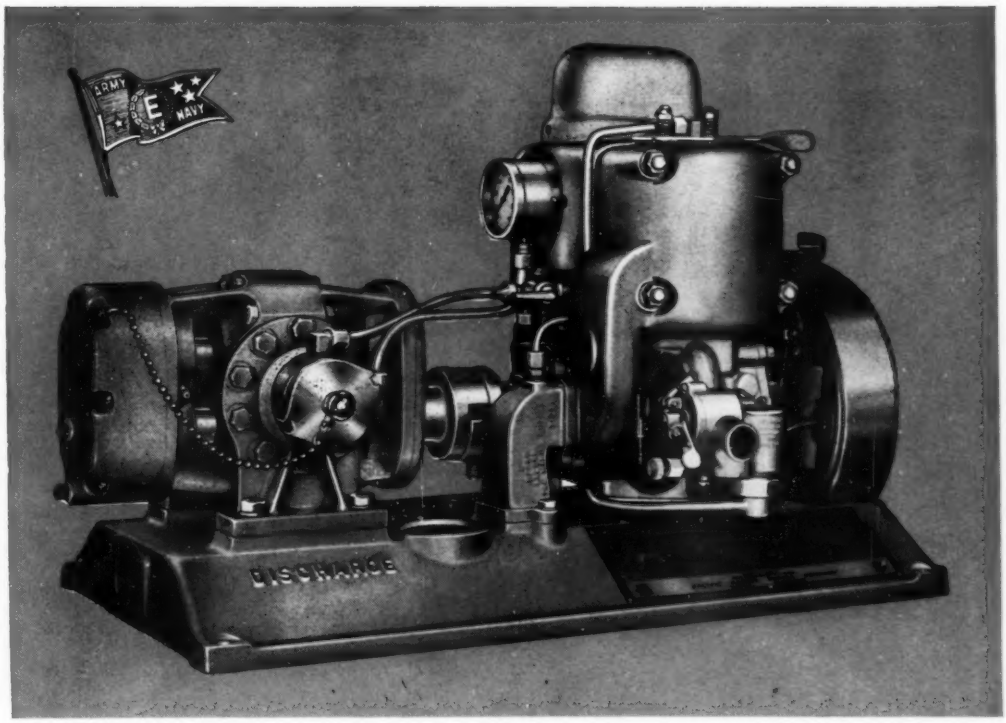

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